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CASE OF FULL-TIME INTACT EXTRAPERITONEAL GESTATION SUCCESSFULLY REMOVED AFTER FIVE YEARS' RETENTION.

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I HAVE thought this case worthy of record as an instance of a rare condition, and because it affords me an opportunity of restating and amplifying some facts I have already published relative to advanced extra-uterine gestation.

The case is briefly as follows:

Mrs. D., aged twenty-nine, married, housewife, residence Oban, admitted to Ward 36, Royal Infirmary, on the recommendation of Dr. Baily, complaining of swelling of the abdomen of about five years' duration.

History.—After one year of married life she thought herself pregnant. At that time amenorrhœa had begun to be followed by morning sickness and by vomiting, which persisted till the end of the fourth and a half month, when quickening was felt. Her breasts had rapidly enlarged, and were full of milk, and a swelling filled the lower half of the abdomen. At the end of the seventh month she had a fright, seeing, as she thought, a woman who had been some time dead. With this fright she had violent palpitation, and henceforth no more fœtal movements were felt. In the meantime her abdomen continued to enlarge up to the end of the eleventh month after the last menstruation. She was then so swollen that she felt

ashamed to go out in public. One day at the end of the eleventh month a severe flooding came on, but when the doctor was summoned she was told, to her surprise, that no child could be born. No account of the discharge of a decidua could be obtained, only blood-clots being noticed. This flooding lasted for twelve hours, and she then passed a large amount of flatus *per anum*. Her abdominal swelling after this greatly disappeared, leaving behind, however, a marked enlargement, which has remained *in statu quo* for these last four years, during which time she has enjoyed remarkably good health, and menstruated regularly. No sudden attack of pain was ever felt in the early months. What really induced her to come into the infirmary was a recurring pain, due, she believed, to an accidental blow.

Sexual History.—Menstruation appears to have been normal, of twenty-eight-day type, seven days' duration.

Pregnancies.—She has never had any full-time child, nor any abortion. She believed herself pregnant when she had the eleven months' amenorrhœa. During this time she had little or no disturbance of bladder or rectal function, except from hæmorrhoids. During the first few years after the flooding she suffered from a gnawing pain, which she attributed to the weight of the tumour.

Physical Examination: *General Appearance.*—She appears to be a healthy woman, and her mucous membranes are well coloured, although she is somewhat sallow. The mammæ are flaccid and soft, as if they had been larger previously; the areolæ large and very dark, and Montgomery's tubercles are present.

Abdomen: *Inspection.*—The skin over the lower part has well-marked *striæ gravidarum*. Reaching as high as the umbilicus, and occupying the whole of the hypogastric and part of the iliac and umbilical regions, is a well-defined swelling, rounded in shape, and inclining slightly to the left. No irregularity is seen on the surface.

Palpation.—The abdominal walls are soft and flaccid, and through them a tense yet elastic swelling can be palpated, about the size of a six-months' pregnancy. It is felt to rise out of the pelvis, and is perfectly smooth and rounded in contour. If anything, it is felt to be more prominent on the left side. A little tenderness is felt on pressure at the spot where the accidental blow was sustained. Fluctuation can be made out, but there is no thrill.

Percussion.—A dull note is got from a point 1 inch above the navel to the symphysis pubis below, and laterally from a point 3 inches internal to the right anterior superior spine to a point

2 inches internal to the left one. On auscultation, no bruit of any kind can be heard.

Mensuration.—Circumference at anterior iliac spine, 39 inches; at level of umbilicus, 36 inches; at level of costal margins, 31 inches; from right anterior superior spine to navel, $7\frac{3}{4}$ inches, with a left corresponding measurement of 7 inches.

On *vaginal examination*, nothing special was felt as to the walls. The cervix was fairly high up, and in the left and posterior fornices some bulging was felt; while in the posterior fornix a peculiar crepitation was noticed, such as one feels in subcutaneous emphysema. The os externum is apparently nulliparous. The uterus, apparently normal in size, lies in the middle line, and feels as if the fundus ran into the anterior wall of the abdominal cyst. Bimanual palpation of the cyst confirms the description already given.

Remarks on Diagnosis.—In this case the diagnosis of retained extra-uterine gestation was arrived at for the following reasons: The history showed—(*a*) Amenorrhœa and all the symptoms of early pregnancy; (*b*) there was a spurious labour, although a decidua was not observed to be discharged; (*c*) the tumour shrank to a certain extent, and remained quiescent for about four years after the spurious labour.

The question arose prior to operation as to the trustworthiness of the woman's account. Might she not have made a mistake in her sensations, and had a rapidly-growing extraperitoneal cyst with a coincident accidental amenorrhœa? May she, in short, not have deluded herself as to the fact of pregnancy? I cross-examined her very carefully, and came to the conclusion that the history could be relied on. The 'vision' is allowable in the Celt, and did not seem to me to detract from the trustworthiness of her account.

The physical signs were those of a cyst lifting up the posterior laminæ of the broad ligaments, and the peritoneum on the posterior wall of the uterus. The crepitus was a remarkable feature, and seemed to me to indicate that there was a connective-tissue base to the cyst, and that gases might be passing from bowel to cyst, as we know probably happens. One would have expected, however, a discharge of bones by the bowel, bladder, or abdominal wall, as so often occurs in such cases, especially where the placenta lies above the fœtus, is thus displaced up, and converted into a mass of blood-clot and crystals, to which infection from the bowel passes. I have already, in another paper, considered the causation of such bone-discharge, and need not enlarge on it at present. What prevented

it in this case was probably the fact of the sac not touching the large bowel at any extraperitoneal part.

Whatever might be the diagnosis, abdominal section was indicated, and I accordingly performed it.

On making the usual incision, I opened the peritoneal cavity, and came on a bulging cyst whose surface was evidently peritoneal, and with a somewhat thin wall in which ramifying vessels could be seen. On passing my hand in, I was able to note the peritoneal reflexion, and found it as follows: On the right lateral aspect the dip was normal; behind, it stopped at the promontory; at the left side it was on a level with the iliac margin; while in front it dipped normally and as deeply as usual. It could be noted that the anterior wall of the cyst and the fundus uteri were continuous, and that the peritoneal reflexion on the left dipped rapidly down in front to the vesico-uterine pouch. The cyst wall was now laid hold of in front, on each side of the middle line, with locking-forceps, and the cyst opened between these by a vertical incision. On passing in my finger, I at once touched fœtal bones, and a thick inodorous brown fluid began to escape freely. Great care was taken to prevent the passage of this into the peritoneal cavity while the bones were being removed piece by piece. They were the bones of a full-time fœtus in an admirable state of preservation; indeed, little needed to be done to make them a museum specimen. I reserve to a subsequent part of the paper a description of their condition.

The sac was now carefully swabbed out, and all fluid removed. In my anxiety not to contaminate the parts, I, unfortunately, did not instruct the nurses to preserve the fluid—an omission on my part I regret exceedingly. On further exploring the cyst-interior with my finger, I could discover no evidence of, or trace of, placenta, cord, or membranes.

The sac could not be enucleated or removed as a whole, and I therefore stitched the opening in its wall to the abdominal wound, closing off the peritoneum in the usual way. I then packed the sac interior with iodoform gauze wrung out of weak biniodide of mercury, bringing the end out on the abdominal surface. The lining of the sac was soft and shreddy in structure.

The patient made an uninterrupted recovery. The discharge remained scanty, and free from odour. No placental débris came away, but one metatarsal bone was passed by the sinus. She was discharged with a small sinus present on October 3, 1901.

The following is a description of the fœtal skeleton (by Dr. George Robertson, resident surgeon, Ward 36):

The bones which make up this rare specimen were in a remarkable state of preservation when removed from the gestation sac. A large number of them lay free in the fluid which the sac contained, and the rest were removed by hand or by swabs. The base of the skull, however, was still articulated, while the bones of the face were covered by the skin and tissues, the eyes, ear, nose, mouth, and tongue being easily seen. The upper part of the thorax and the neck of the fœtus were fairly well preserved, and continuous with the remains of the skull and face. One arm, intact as far as the wrist, was attached to the thorax; it was covered with skin, but the hand was absent. The thorax was collapsed, all the ribs having escaped into the sac. One of the legs was covered here and there with skin and muscle. It was in this limb that the only epiphysis of hyaline cartilage was found, and this showed no trace of the ossific node usually found here in a fœtus at full time.

The bones found free in the sac were carefully collected, washed clean, and those with tissues were scraped, washed, and dried. When arranged in the definite order of the skeleton (*vide* plate from photograph), an almost complete skeleton was put together. The bones present are:

(*a*) **Head and Face.**—1. Occipital bone; the basi-occipital and the condyles in two separate pieces.
2. Sphenoid bone; body and lesser wings together, greater wings separate.
3. Two parietal bones; the right broken in removal.
4. Two frontal bones.
5. The ethmoid bone in two halves.
6. Two temporal bones; the left, with the middle ear and the three ossicles, in position. The right middle ear is empty, and only the stapes present.
7. Two malar bones.
8. Two lachrymal bones.
9. Two nasal bones.
10. The vomer.
11. One middle turbinated bone.
12. Two superior maxillæ, with teeth present in a few of the alveoli.

(*b*) **Thorax and Vertebral Column.**—1. Manubrium sterni lost; first division of gladiolus sterni present.
2. Twenty-four ribs.
3. Twenty-six bodies of vertebræ.

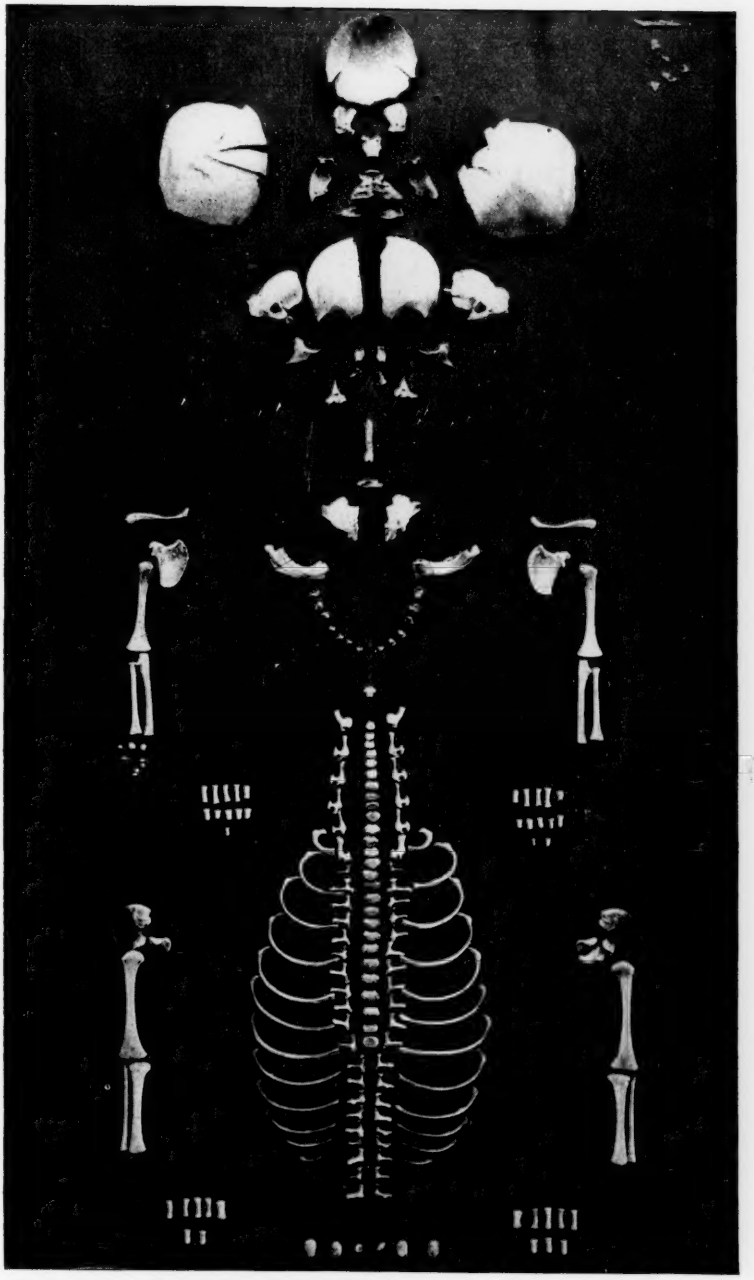
4. First segment of sacrum ; no alæ present.
5. Twenty-six pairs of laminæ of vertebræ ; no intervertebral discs were present.

(*c*) **Extremities.**—*Upper:* 1. Right and left clavicle.
2. Right and left scapulæ ; coracoid process lost on both sides.
3. Right and left humeri.
4. Right and left ulnæ.
5. Right and left radii.
6. Five carpal bones of the right hand.
7. Metacarpals and phalanges of right and left hands. No epiphyses present.

Lower: 1. Os innominatum on each side. Ilium, ischium, and pubes separate, and all present on the left side, but ischium absent on right side.
2. Right and left femora.
3. Right and left tibiæ.
4. Right and left fibulæ.
5. Six tarsal bones, three on each side.
6. Metatarsals and phalanges of right and left feet. Only one epiphysis found as hyaline cartilage, lower end of femur.

Unknown.—A few broken fragments of bone were found whose position in the skeleton could not be settled. They are in all probability, from their delicate nature, pieces of the walls of the ethmoidal and sphenoidal sinuses.

Explanatory Comment.—This gestation had begun in the left tube, developed between the layers of the left broad ligament, and then so grown that it lifted up the peritoneum from the posterior wall of the uterus, and also insinuated itself between the layers of the right broad ligament. It thus practically lifted up the posterior pelvic peritoneum, and is, in Taylor's nomenclature, 'posterior tubo-ligamentary,' or it might be described as an 'intact extraperitoneal form with posterior lifting of peritoneum.' One extraordinary feature is the almost entire absorption of the soft tissues. All the soft tissues —skin, muscles, viscera, brain—had become disintegrated or had disappeared. The exceptions have been already noted. No trace of placenta, cord or membranes was found. This absorption had not happened in the peritoneal cavity, which is usually credited with unusual absorptive powers, but in an artificially-formed connective-tissue space. There was no putrefaction, no fœtor, and during all the four years following the death of the fœtus and its slow breaking up, no disturbance of the patient's health.



SKELETON OF FŒTUS RETAINED FIVE YEARS IN AN EXTRAPERITONEAL SAC.

I now wish to make some remarks on extraperitoneal pregnancy, especially as it has been misunderstood in some of its aspects.

A point long at issue was the origin of advanced extra-uterine gestation. The current opinion in the seventies, even now held by many, was that it was intraperitoneal in origin and development—*i.e.*, that the villi of the chorion had actually grafted on the free surface of the peritoneum, which therefore acted as a serotina. In 1889 Matthews Duncan stated his opinion in the following words: 'Every author on this subject recognises the peritoneal insertion of the placenta, and in every such case it is, I believe, the original insertion.' The only vigorous opponent of this pathology was Lawson Tait, who strongly supported Dezeimeris' view that there was a broad ligament or subperitoneal form at mid-term. Tait very clearly recognised the extraperitoneal form as early as 1877, and in his text-book wrote as follows: 'If, however, the sac be found to be covered by peritoneum—that is, if the case be one of the extraperitoneal variety . . . in such a case the peritoneum will be found lifted up from its usual relations, so that it runs on the walls at a much higher level than is usual.' This was a remarkable clinical fact, and Tait deserves the highest credit for it. It must be remembered that he had the whole weight of specialism against him. In 1887 I was fortunate enough to obtain a cadaver where advanced extra-uterine gestation was present, and along with the late Mr. Carter, anatomical lecturer, Glasgow, examined it sectionally after freezing, the sections all being sagittal-mesial and sagittal-lateral. We were thus able to make out the peritoneal relations of the gestation very accurately. These were really somewhat complex. We established (1) that the gestation was extraperitoneal and not intraperitoneal (this was the great fact, and still remains the main feature of such gestations, viz., that the fœtus and placenta are extraperitoneal, or if the fœtus should have broken through into the peritoneum, the placenta is still attached to the extraperitoneal connective tissue, or may be in the tube); (2) that the placenta was displaced up to about 9 to 10 inches (25 centimetres) on the right side of the anterior abdominal wall; (3) that the placenta was a mass of blood-clot and distorted villi; (4) that the important peritoneal relation was on the right side, where it was lifted up about 10 inches above the pubes.

The peritoneum may be lifted up posteriorly, as Dr. Taylor of Birmingham has pointed out in his valuable Ingleby Lectures. We can thus speak of extraperitoneal gestation with (1) posterior lifting of peritoneum, and (2) with anterior lifting of peritoneum.

The case I have recorded is thus one of those Taylor has drawn

attention to. The most remarkable feature in the case I have been unable to explain. One can only marvel at the resources of Nature, and puzzle how a full-time fœtus and its appendages were in an artificially-formed connective-tissue space disintegrated and preserved aseptic for such a long period.

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MADAME MILCENT,
Died March 10, 1824, aged 38 years.
Her death was accelerated by long sufferings,
Which she bore with great courage.
She carried in her body a child for eight years;
Twelve months living and seven years dead.
To prove the truth of this, Doctors Dubois and
Belivier extracted it at her decease, when it
Was found well formed and
Perfectly preserved.'

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A CASE OF CÆSAREAN SECTION PERFORMED FOR THE THIRD TIME ON THE SAME PATIENT UNDER LOCAL ANÆSTHESIA.

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F. W., aged twenty-seven, a dwarf with a 2½-inch conjugate, on whom I had twice performed Cæsarean section, was admitted to University College Hospital on March 17, 1900. Cæsarean section was performed for the third time on April 3, 1900, within a few days of term, labour-pains being present. The uterus reached up to 10¾ inches above the pubes. The scar was 6¾ inches in length, extending downwards from 1 inch above the umbilicus. The fœtal head was above the pelvic brim, the back directed towards the left.

Before the operation I injected Schleich's eucaine solution along the scar for 6 inches. I then incised the scar and opened the uterus for a length of 4 inches, afterwards enlarging the wound a little with scissors. The placenta was notched by the incision. The child was delivered by the head in one minute fifteen seconds; the placenta and membranes were removed in two minutes thirty seconds from the commencement of the operation. The uterus was then stitched up with deep and superficial silk sutures (the deep ones missing the endometrium) and the abdominal wall was closed with through stitches of silkworm-gut and buried fascial stitches of fine silk. Owing to the adhesion of the uterus to the abdominal wall resulting from the previous operations, the peritoneum was only slightly opened at the upper and left part of the incision. The whole operation took twenty-five minutes till the dressing was applied.

The first part of the operation (incision and delivery) was practically painless; the sewing up of the wound in the uterus was also quite painless, but there was a good deal of pain during the abdominal stitching, especially in sewing up the fascia. The patient was sick in the morning before, and once during the operation. Afterwards she was pale, and the face was covered with a cold sweat; the pulse was 80. The child was very lively and weighed 6 pounds 13 ounces. The patient had after-pains for forty-eight hours. There was no other trouble during convalescence, the

wound healed by first intention, and the patient left the hospital on May 2, 1900, the uterus being well involuted: the child also, which the patient had suckled, was very well. On July 12, 1900—fourteen weeks after birth—the child weighed 11 pounds. Three fascial silks were on that day found exposed and were removed; there was no pus, and no redness around them, and the stitches had evidently been rubbed through on account of the thinness of the abdominal wall.

The highest four-hour temperature was 100·6° on the day after operation, 100·2° on April 8 and 9, and 100·4° on April 22. The pulse was 120 to 132 on April 5, 108 to 120 on the 6, 104 to 120 on the 7, 96 to 108 on the 8, and remained at about 80 to 90 during the rest of the stay in hospital.

The features in this case which are perhaps worthy of note are the repetition of the Cæsarean section and its performance under local anæsthesia.

In the fact that the operation has been repeated in the same patient there is nothing novel. This has been done on many occasions by others, and by myself in another case; but I think sufficient attention has not been called to the simplicity of the repeated operation. If the uterine wound has been made in the usual position, the anterior surface of the uterus usually adheres to the abdominal wall, and at a subsequent operation the child may be delivered with but slight (or no) opening of the general peritoneum. This reduces the risk of sepsis and simplifies the recovery.

As a complement of Cæsarean section the removal of the body or whole of the uterus ('Porro's operation') has, in the twenty-five years since it was instituted by Edoardo Porro (May 21, 1876, to May 21, 1901), been performed 1,097 times, with a total maternal mortality of 24·8 per cent. (in the last ten years of 15·4 per cent.).* Various devices having the object of sterilizing the patient—tying the tubes, cutting the tubes, excising portions of the tubes, covering the tube-stumps with peritoneum—have been tried, and have mostly been found unreliable, and even dangerous: they also necessarily leave a seam which may favour intestinal adhesion and obstruction. There appears, indeed, to be no certain way of sterilizing a woman except the removal of the ovaries, which entails well-known disadvantages. During the last few years there has been a marked tendency towards Cæsarean hysterectomy. In my opinion, although that operation is of great value in certain cases (such as fibroids,

* 'L' Operazione Cesarea Porro,' by Professor Truzzi for the Società Italiana di Ostetricia e Ginecologia.' Roma, 1901.

uncontrollable hæmorrhage, cancer, infected uterus, etc.), it should not in simple cases of pelvic contraction be the operation of election and displace the conservative operation. Nor do I think it justifiable to sterilize patients in whom contraction of the pelvis is the only trouble. Our duty as physicians is to restore the patient to as normal a condition as possible, and that is done by the conservative operation, which at the same time offers no seam or stump to which intestine may adhere. This danger appears to me to be a fatal objection to the fundal incision of Fritsch.

In addition to the sterilization of the patient and the removal of the placental site, another reason given for the performance of Cæsarean hysterectomy is the danger of rupture of the uterus in a subsequent pregnancy. Without having made special research in this direction, I do not think the number of cases of this accident, after careful suture of the uterine wound, bears any considerable proportion to the number of pregnancies following a conservative operation, and the accident has in some cases been due to manœuvres in delivery *per vaginam*, and might have been avoided by Cæsarean section before labour or in its early stage. Moreover, particulars of the mode of suture and of union of the uterine wound are sometimes wanting in the description of cases in which the accident has occurred. In the three cases of repeated Cæsarean section which I have performed, the site of the scar appeared to be as thick and strong as the neighbouring part of the organ. I am aware that spontaneous rupture has taken place during pregnancy, but not, I think, with a frequency sufficient to justify us in depriving a woman of her chance of maternity. The case I have described above is of interest in regard to the question of sterilization. The patient was very anxious to have a living child. The children delivered by the first two Cæsarean sections died of diarrhœa when a fortnight old (one of them had a spina bifida). The child delivered by the third operation survives, to the great joy of the mother, who would now be disconsolate if I had sterilized her at a previous operation. The evidence we possess at the present time shows that repeated Cæsarean section is not more (I believe it is really less) dangerous than the first operation, and until it has been shown that the mortality of Porro's operation is considerably less than that of the conservative operation, and that rupture of the uterus in a subsequent pregnancy is of not infrequent occurrence and is unavoidable by proper care, I shall continue to believe that in simple cases of contracted pelvis the conservative operation without sterilization is the operation of election.

With regard to Schleich's method of infiltration anæsthesia, there is no doubt that it is one of the greatest advances made in surgery during recent years, but it is more suited for small (or at least superficial) operations on the limbs and trunk than for those involving much manipulation within the peritoneal cavity. It is necessary first of all that the patient should possess pretty firm 'nerves,' otherwise she will suffer from mental shock. My case shows that the child may be delivered with practically no pain to the mother, whose subsequent condition is certainly better than after a general anæsthetic. The child also was at birth livelier than I have ever seen in a case of Cæsarean section performed under ether anæsthesia.

The suturing of the abdominal wall is painful, especially the suturing of the fascia, and, as this pain is due apparently in part to traction on the fascia and peritoneum, it seems to be unavoidable. Yet I feel sure that a patient who is willing to put up with this pain will recover better after local than after general anæsthesia, and the child is not asphyxiated as it often is when a general anæsthetic is employed. The pain during the stitching of the abdominal wall could, of course, be prevented by giving ether during that part of the operation.

But for a patient who is at all 'nervous,' general anæsthesia throughout is, in my opinion, preferable to local anæsthesia in the performance of Cæsarean section.

A CASE OF SPONTANEOUS RUPTURE OF AN APPARENTLY NORMAL UTERUS AT THE COMMENCEMENT OF LABOUR.

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Rupture of the uterus during pregnancy or parturition is, happily, a comparatively rare occurrence. In certain instances we can recognise the conditions which are likely to predispose to rupture, in others we can detect the signs of threatened rupture, and in this way we can, in a number of cases, exercise a salutary prophylaxis with the best results. Further, though cases arise from time to time in which no opportunity for preventive measures is given us, the resources of modern surgery encourage us to interfere, even in apparently desperate circumstances, and not infrequently this boldness is amply justified. It may, I think, be safely said that the occurrence of a case of rupture of the uterus in the hands of an obstetrician is, in the great majority of cases, a reproach to him and a slight on his art. In most cases the conditions which predispose to it are so obvious, and the signs which precede it are so easily recognised, that, provided the patient comes under observation in reasonable time, the accident should not occur. But, on the other hand, cases arise from time to time in which uterine rupture occurs under apparently normal conditions, and develops without any premonitory sign whatever. In such cases prevention is, of course, impossible in our present knowledge, and treatment after the fact is our only resort.

If we glance for a moment at a scheme of the commonly accepted causes of uterine rupture, we may better realize the distinction between these two sets of cases. We may conveniently divide the immediate causes of rupture into: (*a*) Traumatic; (*b*) Spontaneous.

(*a*) *Traumatic.*—In this group we include all cases where the rupture is caused by some direct mechanical violence, such as the forcible introduction of the hand into the uterus, the unskilful performance of the operation of internal version, the improper use of forceps, etc. It need hardly be said that such cases—the result of *internal traumatism*—should never occur.

Under the head of traumatic causes we must also include a small

group of cases in which the uterus has ruptured late in pregnancy, apparently as the result of a blow on the abdomen, or of a fall—*external traumatism*. Such cases have been put on record by Schroeder,[1] Plenio,[2] Slavjansky,[3] and others. It may be that some of these cases were examples of interstitial tubal pregnancy, and that in them rupture took place in a region thinned out to the point of giving way, and that very little violence was required to determine the rupture. In any case occurring after the fifth month, where the rupture was fundal and where the tube was involved, we would naturally think of this as a possible explanation.

In some of the cases recorded this factor has, on the other hand, been excluded, and some other condition, perhaps a diseased or degenerated condition of the uterine tissue, may have facilitated rupture.

(*b*) *Spontaneous.* — In cases of spontaneous rupture we assume that the immediately determining cause is the contraction of the uterus. The predisposing conditions — those which render the uterus liable to rupture—are various. The great majority of those cases are, however, associated with some condition arising out of an abnormality of either of two of the factors of labour—the passage or the passenger.

In the former case, the passage, we may meet with a rigid os or a contracted pelvis; in the latter, the passenger, with a hydrocephalic head or a malpresentation. Thanks in the main to the classic work of Bandl,[4] we are familiar with the mechanism by which the process occurs. Given any condition which interferes with or delays the dilatation of the os, the lower uterine segment becomes thinned out, while the muscular tissue of the upper segment gathers itself together into a sort of cap on the upper pole of the uterine mass. The strain on the thinned-out lower segment increases until it gives way, in most cases not far from the junction of the two segments. A tear so produced will in all cases tend to run across the long uterine axis, though the general direction of the tear may be altered by the splitting produced by the escape of the uterine contents. Thus the developed tear may run obliquely or directly upwards.

If, on the other hand, the thinning out of the lower segment is associated with a contracted pelvis, the position of the rupture may be determined by the grinding of some portion of the thinning segment between the fœtal head and some ridge of the bony pelvis. A contused area may thus be formed in which the rupture may begin, in a transverse direction at first, and end vertically or obliquely

according to circumstances. Or it may be that the point of rupture may be determined by an excessive thinning out of the uterine wall over a prominent point in a malpresentation, such as the chin in a face case, or the occiput or shoulder in a transverse case.

But, on the other hand, spontaneous rupture may occur in certain cases without any process such as that described by Bandl. There may be no abnormal obstruction to the escape of the contents; the labour may only have begun, and, moreover, the tear may have no special relation to the lower segment, though it may, by extension, involve it too. Three sets of cases may be found in this group:

1. Some of those cases already referred to of interstitial pregnancy fall under this group. No doubt in most instances this condition causes rupture at the fifth or sixth month, but a certain number may continue to full time, and the rupture may follow the first labour-pain. One of the most interesting of these cases is recorded by Paul Bar and R. Mercier.[5] In this case the patient was last unwell on October 8, and on July 10 in the following year the uterus ruptured without any apparent cause. Laparotomy was performed, but the patient died. Careful examination of the uterus showed that the pregnancy involved the right tube. The sac had grown into the uterine cavity, producing a tubo-uterine pregnancy, but apparently the first contraction ruptured the uterus at the junction of the tube and the cornu.

2. Spontaneous rupture may occur in certain *abnormal* conditions of the uterus, such as the bicornuous uterus, the myomatous uterus, and in the uterus which has previously been the subject of a Cæsarean operation. One can easily understand the predisposing tendency to rupture associated with the cicatrix of a Cæsarean operation. Krukenberg[6] has collected thirteen cases of women in whom the Cæsarean operation had been performed, in each of whom the uterus ruptured in a subsequent pregnancy; and Rose and Munde record a case in which in four successive pregnancies the uterus ruptured spontaneously.

3. In the last place there is a very small number of cases on record in which rupture has occurred at the beginning of labour in a uterus of normal conformation, and in which there is no gross complication, such as a bicornuous state, the presence of a fibroid, or any such condition. Cases of this nature have been recorded by Ingerslev,[7] by Hofmeier,[8] and by Professor Simpson.[9]

In the two first cases nothing abnormal in the uterus could be found, and the histological examination revealed nothing which could account for the accident. In Simpson's case the muscular

fibre showed signs of fatty degeneration in a marked degree. To this group belongs the case which I now desire to relate.

Early on the morning of July 22 last, my friend, Dr. Moorhouse, asked me by telephone to come to Stirling to see a case of rupture of the uterus which had occurred there during the night. Dr. Lackie very kindly went with me, and when we arrived, about 10 a.m., I obtained the following account of the case from Dr. Moorhouse:

The woman, aged twenty-seven, 4-para, was a patient of Dr. McNicol, and in his absence on holiday she had sent for Dr. Moorhouse at 2.30 a.m. She was at that time complaining of severe pain on the left side of the abdomen, and crying out for chloroform and instruments. She had taken a dose of castor-oil on the previous day, which had moved the bowels twice. The pain had begun at 11.30 p.m. on the 21st at a spot halfway between the umbilicus and the left anterior superior iliac spine. She thought the pain at first was due to the castor-oil, as it was entirely in the front.

Dr. Moorhouse could not hear the fœtal heart, and he noticed the tenseness of the tumour and its marked deflection to the left side. There seemed to be no contractions sufficient to account for the pain complained of.

Per vaginam, there was no sign of any presenting part, the finger could not be passed through the os, and the cervix was not taken up. On the presumption that these were false pains, $\frac{1}{8}$-grain of morphia was given. At 3 a.m. the dose was repeated. By 3.30 the pain had extended over the whole tumour, was more severe, and the patient was continually crying out. There was no change in the cervix. The temperature was 96°, and the pulse 104. At 4 a.m., on examining the abdomen, the fœtal parts could be felt at the upper end of the tumour with unusual distinctness. One part, just below the ensiform cartilage, could be seized between the finger and thumb. Drs. Mackintosh and Whytt saw the patient in consultation, and it was thought that it was most likely a case of extra-uterine gestation. The morphia was repeated, and warm fomentations were applied to the abdomen, which seemed to soothe the pain for a little.

At 5 a.m. the pain became more severe, the cheeks became flushed, and the eyes sunken. Temperature 97°, pulse 108. At 8 a.m. the patient was removed to the Royal Infirmary, to which she was admitted by the kindness of Dr. Mackintosh. She bore the journey well. It was noticed that on lifting her out of bed there were some blood-stains on the bed-clothes.

At 10.30 I saw the patient in a side-ward of the infirmary. She presented the appearance of one in a state of profound collapse. The face was drawn and pallid, the eyes half closed, and she was only able to answer questions in a dazed fashion and in a whisper. On examination of the abdomen it presented a curious barrel-shaped appearance; it was extremely tense, and any attempt at palpation caused apparently much suffering. Chloroform was given, and then the parts of the fœtus could be felt with extraordinary distinctness. There could be no doubt that the fœtus was either in the abdomen or else in a very thin sac. On vaginal examination, the finger could be easily passed into the cervix, which seemed only partially taken up. Beyond the internal os the finger passed into an empty cavity, that of the uterus, and in the left side a rent could be felt, through which the finger entered the cavity of the abdomen. In this could be felt the edge of the placenta, and a little beyond the head of the fœtus could be made out. It was thus quite plain that we had to deal with a case of uterine rupture, whatever may have been the cause, and, further, it was clear that the uterine contents had entirely escaped into the abdominal cavity.

The pulse was now 120, very feeble at the wrist, and the temperature 96° F. The patient was plainly in a desperate condition, and though the prospect of an operation being successful seemed exceedingly faint, yet it was obvious that it gave her the only chance, though a small one. Accordingly, she was carefully removed to the operating theatre, and the usual preparations for opening the abdomen were rapidly made.

On making the incision, which extended from an inch above the umbilicus to within an inch of the pubis, an enormous quantity of fluid escaped, consisting of blood and liquor amnii. I rapidly extracted the fœtus and placenta, both of which were found lying in the abdominal cavity. I then brought the uterus out of the wound. The uterus was firmly retracted, and a tear was found which extended from a point about an inch behind the left Fallopian tube downwards and forwards along the border of the uterus to the vaginal roof. Near the lower end of the rent the line of laceration turned somewhat sharply towards the front and involved the left upper region of the bladder.

There was an alarming amount of hæmorrhage going on both from the tear in the uterus as well as from the proximal end of the torn uterine artery. With a view to checking this, I tried to secure the lower end of the uterus in a ligature of elastic tubing; but a difficulty arose which rendered this impossible. It was found that the bladder was situated so high up on the anterior surface of the uterus that any ligature applied near the neck of the uterus would include at least half the bladder. I therefore resolved to remove the uterus. The ovarian arteries were tied on both sides, the bladder was dissected off the anterior wall, and the uterine artery of the right side ligatured. The uterus was then amputated through the cervix. Considerable difficulty was found in securing the proximal end of the left uterine artery. As a matter of fact, there were several large vessels, each of which had to be secured in separate ligatures, and considerable time was spent at this stage of the operation. At one time I thought it would be necessary to tie the internal iliac artery, as the main trunk of the uterine had retracted so far into the cellular tissue below the broad ligament that I found it exceedingly difficult to secure it.

I next dealt with the rent in the bladder. This was closed by several fine cat-gut stitches. The edges of the peritoneal folds left by the removal of the uterus were then carefully closed with fine silk. I purposely did *not* stitch the stump of the cervix, as I felt that it was better left open to serve as a drain, on account of the probability of oozing between the layers of the broad ligament.

Up to this time the operation had occupied rather more than an hour, most of the time having been spent in securing the various bleeding-points connected with the left uterine artery. The patient had, considering everything, stood the operation remarkably well, but naturally the pulse was showing further signs of flagging, and I was anxious to complete the necessary steps of the operation as soon as possible. For this, as well as for other reasons, I resolved to dispense with any attempt at an abdominal toilet. This may appear to have been a somewhat hazardous omission, seeing that the abdominal cavity contained not only blood, but also the remains of the liquor amnii, a very obvious quantity of meconium, not to mention portions of vernix caseosa, with which the child was particularly well provided. My confidence in the capacity of the peritoneum to deal with such matters was, however, fully justified, as the sequel showed. Accordingly, I closed the abdominal incision as rapidly as possible, using through and through silkworm-gut sutures.

Before removing the patient from the table a copious enema of hot saline containing 1 ounce of brandy was given. A dose of $\frac{1}{60}$ grain of strychnine was also administered hypodermically, and the patient put back to bed. The temperature was at this time 97° F., and the pulse 135.

At 12.30, when I left her, the pulse had gained somewhat in quality, and she had recovered consciousness.

At 9 p.m. 16 ounces of urine were drawn off by the catheter, which was a satisfactory evidence that the function of the bladder had been established, and the temperature was 99° F., and the pulse 120.

On the following day the temperature was normal at 8 a.m., and from that day progress was satisfactory and practically uneventful until the twelfth. I saw her on the seventh day after the operation, and found her remarkably well. On the thirteenth day the temperature rose to 102·6°; on the following day it reached 104°, and on the sixteenth day, at 10 a.m., it reached 106°. This was accompanied by a severe rigor, and a few hours later a copious purulent discharge escaped from the vagina. This was followed by an immediate fall of temperature to 96·4°. I saw the patient on the next day. The temperature was again normal. On vaginal examination, a boggy, soft swelling could be felt in the left lateral fornix, and on pressure upon this, a stream of thin sanious pus escaped through the cervix.

The explanation of this lies, probably, in the fact that during the operation the supply of thin silk ran short, and a further quantity was sterilized somewhat hurriedly, and, I fear, rather imperfectly. Some of this was used in tying the last of the branches of the left uterine artery. This had, in all probability, become septic, but, happily, not before the peritoneum had become safely shut off. The resulting abscess was thus entirely extra-peritoneal, and it found a comparatively easy exit through the unsutured cervical canal.

The discharge continued for several days in varying amount, and the temperature flickered a little, but nothing occurred to give rise to any further anxiety, and the recovery of the patient was afterwards uneventful. She was discharged on September 14, and is at the present time in good health.

In considering the details of this remarkable case, I find there are some points of interest common to it and the one recorded by Professor Simpson in 1866, and already referred to. In both cases the accident seems to have occurred at the very beginning of the labour; in both labour appears to have occurred at the full time; and in both, on first examination, the cervix was found to be high, flaccid, and undilated. Further, in neither was there any serious external hæmorrhage, while in both the child had escaped entirely through the rent, although in Simpson's case the placenta was still in the uterus when the diagnosis of rupture was made. In neither was the tube involved in the rent. In Simpson's case 'the rent was found to run up precisely along the left side of the uterus, immediately in front of the broad ligament, from the level of the os internum till within ½ inch of the Fallopian tube, where it turned somewhat abruptly forward and upward along the anterior wall, and terminated almost at the mesial line about an inch below the fundus.'

In my case, as you see from the amputated uterus, the rent extends from a point about an inch behind the left tube down the left border as far as the amputated surface. Beyond this it extended to the junction of the cervix and vagina. The tear in the bladder is not

very easily explained. The bladder was abnormally high up, occupying almost three-fifths of the anterior surface of the retracted uterus. The damage to the bladder may have been caused by the escape of the fœtus, a not unlikely possibility if it had been distended at the time. It may, on the other hand, have been caused by the manipulation necessary to withdraw the uterus through the incision; but I think this is less likely, as the wound was free and the withdrawal quite easy.

With regard to the question as to how this uterus ruptured, I can offer no answer. To the naked eye it presents no abnormality. It is not myomatous, and there is no sign of a double horn nor of any other peculiarity. Microscopically a portion taken from the anterior edge of the tear showed a perfectly normal structure without any suggestion of a fatty change. In this respect it differs from Simpson's case, in which a fatty degeneration was well marked. Nevertheless, it is almost certain that there must be some obscure change in the quality of the uterine muscle. Apart from this, the accident is to me inconceivable.

In case some light might be thrown on the causation by the previous obstetric history of the patient, I obtained the following notes by the kindness of Dr. McNicol:

Menstruation began at fifteen, type thirty days, duration two days, and quite painless.

First child six years ago, forceps, stillborn.

Second child, forceps, stillborn.

Third child, forceps, lived one year.

Fourth child, forceps, still alive.

The fourth confinement took place on April 24, 1900. She got up on the fifth day. She had no milk. She had little appetite for a time, but this returned shortly, and she made a good recovery.

Menstruation took place a month after confinement, and every month thereafter until October. Last period October 25, 1900. During pregnancy there was less general disturbance and sickness than in any former one. There was no vaginal discharge, nor anything whatever to suggest the least abnormality. So far, then, we can in the meantime describe it simply as a case of spontaneous rupture in an apparently normal uterus.

Apart, however, from the question of the etiology of the accident, I think there are some points of interest of a general nature to which I should like briefly to refer.

1. As to the indication for the operation, I am sure it will be admitted that the results of cases such as this justify the performance

of laparotomy where indicated in even extreme degrees of exhaustion and collapse. A better example of this could scarcely be required if you recall the fact that in this case the rupture occurred at least nine hours before the operation, and that the latter was begun with a subnormal temperature and a scarcely perceptible pulse.

2. If in any such case I found a similar difficulty in securing the torn ends of the uterine artery, I should try to save time and hæmorrhage by tying the internal iliac. This part of the operation in this instance took more time than all the rest.

3. I venture to think that I did right in leaving the cervical stump unsutured. Had I closed it in the ordinary way, I am sure that the abscess which developed in the second week would have had more difficulty in finding an exit, and the result might have been very different. In any case where there is a risk of subperitoneal oozing, the open canal would provide an easy means of drainage.

4. The anatomical peculiarity of the bladder in this case is well worth keeping in mind. If a similar condition were present in any case where a Porro operation was proposed, the bladder would certainly be included in the ligature, if applied in the way usually described. It would be well in all such cases to determine the exact upper limit of the bladder before applying the elastic or other ligature.

5. And, lastly, as to the 'toilet of the peritoneum.' In scarcely any detail of the technique of abdominal surgery has practice been modified so much during the last fifteen or twenty-five years as in the matter of the peritoneal toilet and drainage. During the early eighties almost every surgeon spent much time and anxiety in the so-called cleansing of the peritoneum, and even then, not satisfied with the success of his endeavours, he not infrequently resorted to drainage either by the glass tube or gauze drain. Endless time and trouble were spent over such fluids as blood, simple ovarian or parovarian fluid; sponge after sponge was inserted into the deep peritoneal pouches, in order to remove every particle. A bystander would have assumed that the most important part of the whole operation was now in progress. One may realize how much stress was laid on this detail when we read that so distinguished an operator as Kelly[10] drained seventy-three of his first hundred cases. In the intervening years clinical and experimental evidence has accumulated to prove beyond all doubt that the peritoneum is in no way incommoded by the presence of considerable quantities of blood or the non-septic contents of any abdominal tumour, and that the time spent in trying to remove them is wasted, while the mechanical disturbance produced by the procedure is harmful in a high degree.

Every abdominal surgeon is aware of the fact that the peritoneum is capable of absorbing immense quantities of one variety of the material found in ovarian cystomata—namely, the gelatinous substance so often found in cysts which have ruptured spontaneously. If the sac is removed it is quite unnecessary to remove the gelatinous material. A few days before I saw the case just described I operated on a woman of seventy-six. A gelatinous tumour had burst a day previously. I removed the sac, but made no attempt to touch the gelatinous mass. In closing the abdominal wound the stuff oozed out between the sutures, yet the patient made a perfect and uneventful recovery.

If any demonstration of the uselessness of 'cleansing' the peritoneum of aseptic material was required, the case recorded surely presents it. When we closed the abdomen we included much blood, both fluid and coagulated, no doubt a considerable amount of liquor amnii, and a very obvious amount of meconium. This had freely escaped from the fœtus, and the whole abdominal viscera were stained a dark green by it. Just as I was about to tie the first stitch Dr. Lackie fished up a piece of whitish matter which proved to be vernix caseosa, and, no doubt, more was left behind. Yet none of these varieties of foreign material seems to have given the peritoneum any trouble. The complication which began to develop on the twelfth day was undoubtedly extraperitoneal. Another case, on which I operated in Ward 36 during Dr. Berry Hart's absence in August, is interesting as bearing on the same question. I opened the abdomen in a young woman to remove, as I supposed, a very mobile ovarian tumour. I found instead that the tumour was a cyst about the size of a small cocoanut, growing from the lower end of the left kidney. I opened the posterior reflection of the peritoneum, and dissected the tumour up to its pedicle without difficulty. The pedicle was short, but after tying it I thought I might remove the whole sac with safety by cutting through the pedicle below the ligature. Unfortunately, I cut into the sac, and the greater part of its contents escaped into the abdominal cavity. The remainder, amounting to about 8 fluid ounces, was collected. I made no attempt to cleanse the peritoneal cavity, but closed first the peritoneal and then the abdominal incision. The patient made a rapid recovery, and left the infirmary in a month.

The fluid was of the colour of coffee, and contained an enormous quantity of cholesterine. When allowed to stand, the surface glistened with multitudes of crystals. When it escaped from the cyst it was quite odourless, but in twelve hours the fœtor which it gave off

passed description. Yet the best part of a pint of this fluid in the peritoneal cavity gave rise to no apparent trouble.

So long, then, as we are not dealing with septic material, I venture to think that the less we disturb the peritoneal cavity by attempts at 'cleansing' the better.

When the matter is septic, the conditions are very different. Then the resources of our art must be exhausted to prevent its entrance into the cavity, and, if these fail us, its removal by direct or indirect means must be secured at all costs.

I desire, in conclusion, to express my grateful acknowledgments to Dr. Lackie for his support in this somewhat trying case. His skilful assistance during the operation very largely contributed to the happy issue.

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TWO CASES OF CARCINOMA OF THE CERVIX COMPLICATING ADVANCED PREGNANCY.

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Pregnancy complicated by cancer of the cervix is unfortunately much more common than is usually supposed, being estimated by Solowij as occurring 1 in 2,000 labours; but in most instances it is demonstrated in the earlier months of pregnancy, and ends in abortion, or is treated at once.

In early cases it is a generally accepted view that the uterus and its contents should be removed as a whole with as little delay as possible by vaginal hysterectomy, this being quite feasible up to four and a half months, and has been performed at the sixth month.

The cases recorded here have advanced beyond this limit, and may therefore be worthy of consideration.

Pregnancy Five and a half Months with Carcinoma of the Cervix—Modified Vaginal Cæsarean Section and Vaginal Hysterectomy.

M. H., aged thirty-four, 5-para, sent to me by Dr. Purdon, of Connahs Quay, was admitted to the Hospital for Women, Liverpool, June 21, 1900, complaining that she was pregnant and had been 'flooding' for the last three months, with only two or three days' intervals of freedom from the bleeding. The history given was that two years previously she was confined of her fourth child, that the labour was difficult and instrumental, and that she was laid up for two months in consequence. This was followed by more or less continued pain in the left side, and a brownish discharge, which appeared every week. Menstruation was not re-established until January, 1900, when she had a normal monthly period, and had not seen anything again until the end of March, when the flooding commenced. She considered she was about four and a half months pregnant.

On examination of the abdomen the uterus was felt to be enlarged, and reaching nearly to the umbilicus. Fœtal movements were felt, but no fœtal heart-sounds heard. Ballottement was elicited *per vaginam*, fœtal head felt through the patulous cervix;

the cervix was enlarged, os patulous, admitting the finger; the lips irregular, ragged, and excavated by malignant growth; the left broad ligament and posterior vaginal fornix infiltrated.

The diagnosis of malignant disease of the cervix was therefore not difficult. The period of pregnancy was evidently more advanced than she thought, probably between the fifth and six month. The treatment decided upon was emptying of the uterus and subsequent vaginal hysterectomy. Accordingly, on June 30 two gum elastic bougies were introduced into the uterus, and the vagina packed with double cyanide gauze. Twenty-four hours later the bougies were expelled from the uterus, but very little uterine contraction was found, consequently another bougie was introduced, and arrangements were made to perform vaginal hysterectomy on July 3. On that day the abortion had not taken place, but the cervix was dilated sufficiently to admit two fingers. Accordingly she was anæsthetized and put upon the table in the dorso-coccygeal position, and I determined to empty the uterus and remove it at the same sitting.

Fixing the cervix with two pairs of volsellæ, an incision was made in the anterior fornix and the bladder dissected off, up to the peritoneal reflection; then the cervix was divided up to the same point, in the middle line, when the fœtus was easily felt, the feet seized, and delivery effected without any difficulty, this proceeding constituting a vaginal Cæsarean section.

The placenta being removed, an incision was made through the posterior vaginal fornix, and the vaginal hysterectomy completed, the broad ligaments being clamped, one Doyen's clamp being placed on the right broad ligament, five small Spencer Wells' clamps being used on the thickened left broad ligament beyond the disease, and the vagina loosely packed with double cyanide gauze. The after-history was uneventful, and the patient left the hospital four weeks later.

The fœtus was a female, weighing 1 pound 10 ounces, and measuring 10½ inches in length. The membrana pupillaris was present, hair on the head, the clitoris prominent, so that it must have been at least five to five and a half months. The microscopical section showed the disease to be carcinoma.

The after-history of the patient was that for some months she was very well, and able to perform her household duties, but early in 1901 she began to suffer great pain, and had irritability of the bladder and painful micturition. I have recently heard from Dr. Purdon that she died of the malignant disease in March, 1901 —*i.e.*, eight months after operation.

The accompanying drawing (Fig. 1) shows the uterus immediately after removal. The whole of the canal of the cervix is involved in the cancerous growth; the anterior incision is prolonged upwards to show the growth. Delivery by dilatation would have been quite easy in such a case, but there would undoubtedly have been tearing of the cervix in doing so; therefore a clean incision which could be made in the direction most suitable, viz., along the anterior wall uncovered by peritoneum, is better than dilating the cervix, tearing and possibly splitting the uterus, and opening the peritoneal cavity.

FIG. 1.—CANCEROUS UTERUS, FIVE AND A HALF MONTHS GRAVID.

This method of delivery was so simple that in a similar case I should not attempt to induce labour, but proceed, after due preparation, to the vaginal Cæsarean section. The incision into the wall of the uterus did not give rise to any troublesome hæmorrhage, and the subsequent vaginal hysterectomy was not harassed at all by bleeding from the uterus. Vaginal Cæsarean section, or incision into the uterus, allows of free access to the cavity of the uterus without opening the peritoneum, and permits of easy extraction of the fœtus. As performed by Dührssen in the later stages of development of the fœtus, it is much more elaborate and necessary. Incisions are made in the posterior vaginal fornix, and the peri-

toneum separated from the posterior vaginal and uterine walls; incision of the posterior wall of the cervix, after the placing of control sutures parallel to the line of intended incision; incision of the anterior vaginal fornix, separation of the bladder from vagina and uterus, and incision of the anterior wall with control sutures. In this way the membranes come into view and are ruptured; the hand is then introduced into the uterus, and the child removed. Next, the control sutures are tied, and the uterus removed. Dührssen advises curetting and cauterizing of the growth as the primary step in this operation.

Advanced Pregnancy (Eight Months), with Carcinoma of the Cervix—Cæsarean Section and Abdominal Hysterectomy.

Mrs. M. E. J., seen in consultation with Dr. Lloyd of Denbigh, October 5, 1900, gave me the following history:

The patient was forty-two years of age, had been married twenty-one years, with eleven pregnancies (six children, five abortions). Her general health had always been good. The last child was born one year and nine months previously, and had been nursed on the breast for twelve months, during the whole of which period the patient had menstruated regularly. The child was weaned in January, 1900, and menstruation ceased early in February. The pregnancy went on quite naturally until August, when there was a sudden rush of blood, followed by a slight blood-stained discharge, and she was put to bed and kept quiet, the condition being deemed a threatened attempt at labour. This passed off, and the patient was able to get about again. A few days before I saw her (October 3) Dr. Lloyd was sent for, and the patient stated that she had had a sudden discharge of water, which appeared to her as if the membranes had ruptured, and on examination the doctor was much disconcerted to find that the cervix was the seat of extensive malignant disease.

The patient was well nourished and healthy looking, the abdomen distended by the uterus enlarged to the eighth month of pregnancy; the fœtal parts were palpated, but there was no fœtal movement, and on auscultation no fœtal heart-sounds were heard. The fœtus was dead. *Per vaginam*, the cervix was felt to be hard and gritty, the malignant mass involving the whole of the cervix and being high up in the pelvis. The position of the os externum was only made out in the malignant growth with considerable difficulty.

The patient's condition was recognised as being most grave, and the prospect of labour in such a case, in the patient's own home in the country, was not viewed very favourably by either Dr. Lloyd or myself; consequently we advocated her removal to the Hospital for Women, Liverpool, where she was admitted under my care on October 10.

The malignant growth, involving as it did the whole of the canal of the cervix, made the prospect of natural labour well-nigh impossible, and associated with the greatest possible risks to the mother. The alternative methods of treatment by incision of the cervix, dilatation, and delivery, Cæsarean section and subsequent hysterectomy were all considered, and felt to be almost equally dangerous; Cæsarean section and immediate abdominal hysterectomy were decided upon, and arrangements made to have the patient prepared for operation five days later.

However, two days afterwards (October 12), the patient complained of pains in the back and right hip, which she thought were like labour pains. On examination the uterus was felt to harden with the pain; but on vaginal examination there was no sign of dilatation of the cervix, so Tr. opii ℥x. were ordered every four hours for relief of the pain. At 1 a.m. (October 13) I was summoned to the hospital, to find labour pains well marked, no sign of dilatation of the cervix, but the umbilical cord thin, pulseless, and attenuated, protruding through the cervix. Thinking that some cervical dilatation would take place, I decided to wait until morning. At 10 a.m. the labour pains were very severe, almost tonic in their contraction, and the uterus thinned out over the fœtus, so that the fœtal parts were most easily made out; the cervix still closed, and a little more of the umbilical cord prolapsed. The temperature was 101·4°, the pulse small, quick (120), the patient restless and excitable. Her condition thus, after twenty-four hours of labour pains, was critical, and demanded that something should be done or the uterus would rupture; accordingly preparations were made at once for Cæsarean section.

Assisted by my colleagues, Drs. Burton and Wallace, this operation was rapidly performed, a dead macerated fœtus and the placenta being removed; after packing the uterine cavity with sponges, the ovarian and uterine arteries were ligatured, and the uterus amputated above the cervix; then, placing the patient in the dorso-coccygeal position and incising the anterior and posterior vaginal fornices, the diseased cervix (which was quite free) was removed *per vaginam;* this route being chosen for the completion of the operation as offering the least risk of infection of the general peritoneal cavity. Double

cyanide gauze was loosely packed from the vagina through into the pelvis, after which the patient's position was again changed, and the abdominal wound sutured with interrupted sutures of silk passing

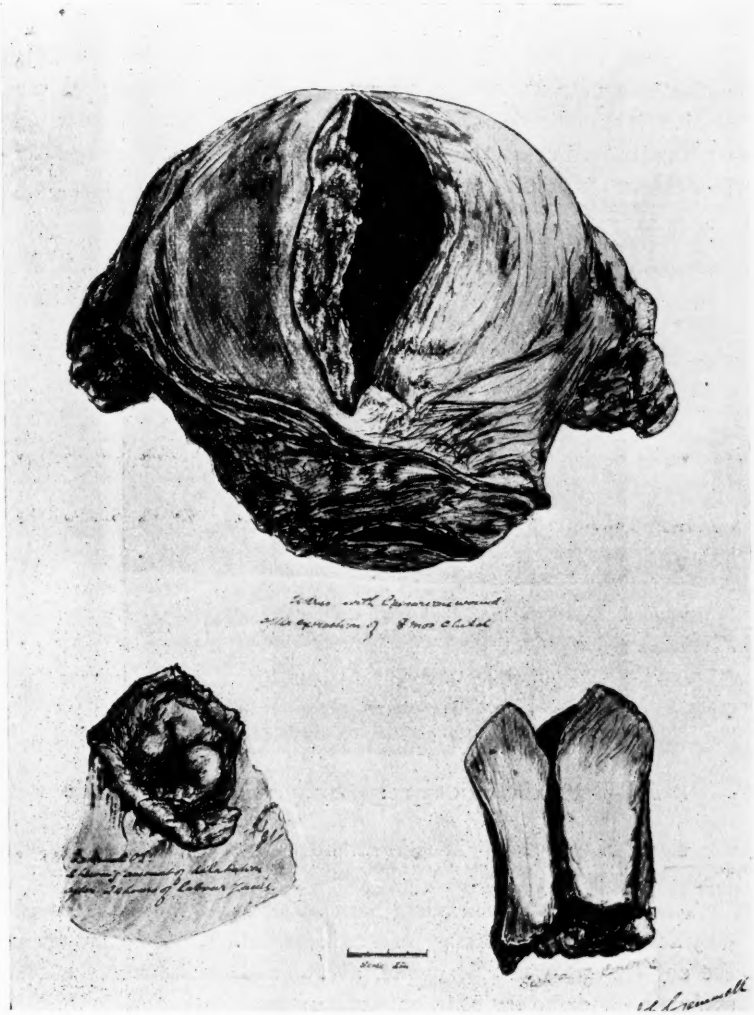

FIG. 2.—CANCEROUS UTERUS, EIGHT MONTHS GRAVID: CERVIX SHOWING ULCERATED OS EXTERNUM, AND CERVIX IN LONGITUDINAL SECTION.

through all the tissues. The abdominal incision extended from the umbilicus to the pubes.

A sterilized towel having been placed well down into the pelvis, and covering the intestines, as the uterus was withdrawn from the

abdominal incision, when the operation was completed the peritoneal surfaces and the pelvic cavity had been so well protected that neither sponging nor flushing was resorted to. There was free oozing from the cut vaginal walls, but the gauze pack from the vagina controlled it.

A nodule the size of a walnut was removed from the omentum, which was thought to be a secondary malignant deposit; but on section it contained broken-down, cheesy, structureless material, such as is seen in caseating tubercular glands, and it was encapsuled in a calcareous covering which cracked and crumbled on handling.

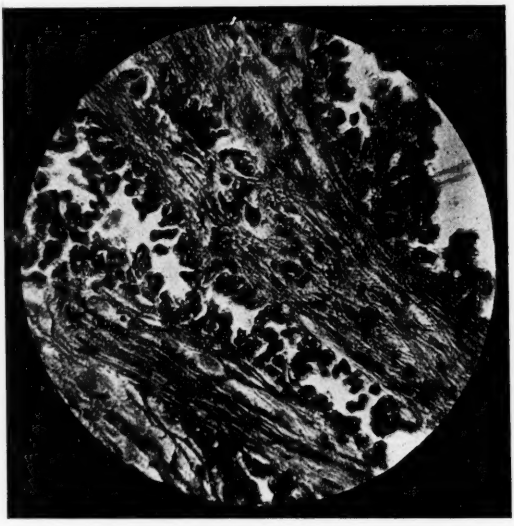

FIG. 3.—CARCINOMA OF CERVIX: PREGNANCY AT EIGHTH MONTH.

No signs of secondary infection were observed about the liver, omentum, or peritoneum.

The cervix (see Fig. 2) was a hard scirrhus-like mass, the canal only admitting of the passage of a cedar pencil. On being cut open the cut surface was hard, white, and shiny, looking like the cut surface of a mammary scirrhus tumour; the whole of the cervical walls was involved, completing a ring round the cervical canal, and having an ulcerating surface about the os externum.

Microscopically the growth is a carcinoma with a large amount of stroma, of the scirrhous type of cancer (see Fig. 3).

The patient rallied well from the operation, and at the end of forty-eight hours the gauze was removed from the vagina; on the

sixth day the first dressing was removed, and the abdominal wound had healed by first intention. The convalescence was uneventful, except for a small stitch-abscess in the track of one of the sutures, which came on about ten days after operation and soon healed. The patient left the hospital on November 10, and a week later travelled home. During the last few days of her stay in hospital the appetite failed, and every night the temperature rose to 99° and 100°; otherwise she seemed quite well, and nothing could be discovered about the abdomen or pelvis to indicate recurrence or other reason for the disturbance.

She died on December 14, 1900, just two months after operation, and Dr. Lloyd wrote me: 'After coming home the temperature went up at night, and she had to take to her bed, occasionally vomiting, and not taking her food well; in about a week nodules could be felt all over the liver, and during the last week there was a decidedly large one to be felt in the stomach. Latterly she became very sick, and some days before she died there was coffee-ground vomiting, and she died of exhaustion.'

Remarks.—Although at the time of operation nothing was seen of malignant disease about the peritoneum or on the surface of the liver, there must have been secondary disease present probably in the liver and stomach, for the marked recurrence with such rapidity is incredible if this were not so. The hardness of the growth and its scirrhus-like type are of interest, and also that the hardness remained, and had not undergone any softening with the pregnancy, as held by some that it should do.

The literature of the subject mainly consists of records of isolated cases, and is very voluminous: Herman,[6] in his paper, tabulated 180 cases, and brought the subject up to the year 1878; but in none of these cases had hysterectomy been performed at the same time as Cæsarean section. Wallace[13] sums up the cases and work on the subject from 1878 down to 1897, and has appended to that paper a most complete and useful reference to the literature.

In reviewing the literature, the conclusions one arrives at are: That pregnancy and the puerperium are most advantageous to the growth of cancer, and therefore the shorter time pregnancy and cancer are allowed to run together the better is it for the patient; that in the later months the complication is more serious; that natural labour should not be allowed to take place, on account of the introduction of the added dangers of septic infection and bruising of tissues; that, after emptying the uterus, no time should elapse before its removal, as involution and absorption favour the spread of car-

cinoma and the production of metastases (Olshausen): therefore radical and immediate operative treatment is indicated; that the best operative results have followed radical operations by the vaginal route; and that, 'whatever the treatment, the results are unsatisfactory.'

The choice of route must be left to the surgeon and his individual case; the vaginal route offers the least chance of infection, and may be facilitated by the removal of the growth as the first step, and either dilatation, version, and extraction of the fœtus performed, or vaginal Cæsarean section. Abdominal hysterectomy, with removal of the cervix *per vaginam*, is preferable to pan-hysterectomy.

The methods of operation described are:

1. The Cæsarean operation and hysterectomy by the abdominal route (Freund).

2. The Cæsarean operation, suture of the uterus and abdomen, then vaginal hysterectomy (Olshausen).

3. The Cæsarean operation, followed by supravaginal hysterectomy, suture of the abdominal parietes, and extirpation of the cervix *per vaginam* (Zweifel).

4. The Cæsarean operation and total hysterectomy *per vaginam* (Dührssen).

5. Pan-hysterectomy and extraction of the child after removal of the uterus (Bland-Sutton).

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A CASE OF VAGINAL CYST CONNECTED WITH A TUBE EXTENDING INTO THE RIGHT HYPOCHONDRIUM.

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Mrs. J., aged twenty-two, was admitted to the New Hospital for Women, September 30, 1895. She had been in good health up to the time of her marriage, eleven months previously. She soon became pregnant, and grew weak and thin. Three months after marriage she experienced pricking pain on micturition, followed shortly by increased frequency, and a yellow or brownish vaginal discharge, which started suddenly with the loss of a considerable amount. When pregnant six months she consulted a doctor on account of a 'swelling in the front passage.' He told her it would disappear; but when, being in labour at the eighth month, she sent for him to attend her, he found that the swelling, which was then outside the vulva, formed an obstacle to delivery, and advised her to go into hospital. Finally, she was delivered with instruments at the Holborn Workhouse, the child living only ten days. From there she came to the out-patient department of the New Hospital, and was admitted.

On admission she complained of discharge and a tumour in the vagina; pain on defæcation, but no trouble with micturition; and pain in the right side of the back, chest, and abdomen.

She was a pretty, fragile, tubercular-looking young woman, who seemed to have been subjected to a good deal of ill-treatment from a dissipated husband. She was anæmic. Temperature on admission, 101·4°; this soon fell to normal, and never again reached above 99·2°. There was no direct evidence of tubercle, though there was an area of weak breathing, diminished vocal resonance and fremitus, with some impairment of note in the right axilla—possibly a local pleurisy.

The abdomen was more resistant and tender all down the right side than the left. There was no frequency of or pain on micturition, and a catheter specimen of urine was acid and showed no albumin. When the patient was lying there was no protrusion of the tumour at the vulva, though she stated that it had been outside the week before.

In the upper part of the anterior wall of the vagina was a smooth elastic swelling, about the size of a small Tangerine orange, bulging, not tender to touch. In front of and close to the cervix were two small openings into it, discharging highly offensive, thick yellow pus. Examination of the bladder with a sound while a probe was passed into the cyst revealed no communication with the bladder. Under an anæsthetic the uterus was found to be anteverted and held somewhat towards the right side, and there was thickening in the right fornix; the ovary on that side could not be felt, it was thought from this cause. On the left side the ovary was easily palpable, and was movable and normal. The uterine sound entered to the normal depth. When the marked tension of the right rectus was overcome by the anæsthetic, an indefinite thickening could be made out deep in the abdomen to the right of the umbilicus.

On introducing a probe into the vaginal sinus, it was found to pass towards the right fornix, and the cyst was slit up in this direction to admit the finger, which felt a smooth-walled cyst in close proximity to the bladder, with a dimple at its upper end, which would not, however, admit a probe. The cyst was dissected out, and in dissection the bladder, which was in close relation to it, was wounded, and urine flowed through. As the cyst was being removed a small area of granulation tissue was noticed at its upper part (externally), and on cutting away the cyst finally there was a fresh gush of pus from above. This was found to come from a track cut across in removing the cyst, leading upwards and backwards towards the right side, the top of which could not be reached with the long sharp spoon. This track was smooth, well defined, and elastic to the touch, quite unlike any ordinary sinus. The tear of the bladder was sewn up with fine catgut Lembert sutures, and a tube 11 inches long passed into the track and brought into a dressing outside the vulva and away from the vaginal wound.

The specimen removed consisted of a smooth-walled cyst, when empty the size of a bantam's egg. The lining was quite smooth and pale red, and at the upper part was a small irregular depression. On the outer surface, to the right of the centre at the upper pole, was the end of a cut tube with plicated lining. A probe passed from this cut tube obliquely through the cyst wall, and appeared in the depression on the inner surface by an opening the size of a pin's head. The microscopic examination gave little help. The cyst wall showed intense round-celled infiltration, and if there had been an epithelial lining it had evidently been destroyed by the suppuration. The section of the tube showed connective, fibrous, and some

muscular tissue, and much round-celled infiltration, but no epithelial lining.

As to the after-course: the bladder wound healed without the slightest trouble, and the vaginal wall forming the bed of the cyst contracted and closed up round the tube that lay in the track. At first a little cellulitis seemed to have been set up in the right broad ligament by the presence of the drainage-tube, but this soon subsided. The track was regularly washed out, and this was the only way by which the discharge was kept even moderately sweet. The amount of discharge varied, as if the track communicated above with a dilatation in which discharge could collect. The discharge during twenty-four hours was collected in a bottle, and was found to consist of pure pus, in which no admixture of urine could be detected. The uterine sound entered the track up to the handle, but without reaching the top. The patient had to go home for a time, and as the sinus continued to discharge fetid pus she was readmitted on February 4, 1896, for an effort to deal more effectually with the suppurating track.

We were very much in the dark as to the nature of the case, owing to the impossibility of locating the upper end of the sinus. It had been suggested that the track might run in the psoas up to some dorsal disease of the spine, but examination of the spine when she was first admitted gave no colour to this suggestion. It did not appear to be a cyst in connection with a patent Gartner's duct, for the track extended far beyond the limits of the right broad ligament. At that time the absence of urea from the discharge, and of an epithelial lining to the track, made me put aside the theory of a supernumerary ureter.

On February 12 an exploratory abdominal section was done in order to locate the sinus, and with the hope of establishing more direct drainage. The incision was made over the point of the sound passed up the sinus from the vagina, practically in the right linea semilunaris, and on examining with the fingers in the abdomen, the track was found to lie altogether posterior to the peritoneum and extremely deep, while we had no instrument, sound, catheter, or bougie, long enough to reach its upper limit. Drainage across the peritoneal cavity was not to be thought of, so the patient was turned over, and an attempt made to reach the track from the border of the erector spinæ. The whole depth of the psoas muscle had to be dissected through, and was healthy throughout; while on its abdominal aspect lay an extremely thick-walled hard cord, the size of a slate pencil, certainly not inflammatory in origin, running up out of reach beneath

the ribs. The depth and extent of the wound, the thickness of the track wall, and the fact that even then the true end of the sinus had not been reached, decided us to abandon any further attempt to drain here, feeling sure as we did that we should get a large deep wound infected by the fetid pus. The wounds were closed and the patient recovered uneventfully, the sinus from the vagina remaining and continuing to discharge. The patient, owing to her husband's irregular and nomadic habits, was lost to sight for a long time, but she came to see me in May, 1900, when I found the track of the same length and discharging the same fetid pus. I tried to persuade her to come into the hospital again, with the hope of further elucidating the case, but in vain, and I have not been able to trace her since and to clear up some points on which I have no note.

The only case that I have been able to find at all resembling this one in the length of a track associated with a vaginal cyst or pseudo-cyst is one published by Conitzer (*Zeitsch. für Geburts. und Gynäk.*, vol. xxxii., p. 293), and quoted as follows by Veit: 'A girl of twenty-six had from childhood constantly had a watery discharge from the vagina. Micturition regular and normal. This watery fluid flowed in drops from an opening to the right of and below the urethral orifice, and under pressure streamed also from a second opening higher up in the anterior wall of the vagina, connected with a cyst the size of a nut. A probe passed into the lower opening entered the cyst, and from the cyst out into the vagina by the upper opening. The fluid was clear, of low specific gravity, alkaline, and contained albumin, but no urea. The cyst was laid open, and showed a prolongation towards the right fornix. Neither the extirpation of the track nor, later, of the right appendages availed to relieve the patient. At the post-mortem a thick-walled track of the thickness of the finger was found running upwards retroperitoneally to the upper pole of the right kidney, where it ended in a mass of atrophic kidney-tissue, containing smooth-walled cavities filled with pus, attached to the true kidney. On the left side also two ureters were present, both of which opened into the bladder.'

It is of interest to inquire what was the origin of the track found in my case. Three theories present themselves for consideration, and are illustrated by the accompanying diagrams, for which, as well as for much valuable suggestion, I am indebted to Professor Arthur Robinson, with whom I had the opportunity of discussing the case recently. I much regret that this opportunity did not occur while the patient was still under observation, for Professor Robinson, from

his intimate acquaintance with the anatomy of the embryo, was able to suggest points of diagnosis between these possible origins, on some of which my notes are silent.

1. A persistent Wolffian duct, patent throughout and connected with some remnants of Wolffian tubules in the neighbourhood of the suprarenal capsule (Fig. 4).

The association of cysts of the anterior vaginal wall with persistence of the inferior part of the Wolffian duct (Gartner's duct) is well-established, but in none of the recorded cases in which this connection has been traced, so far as I can find, has the track passed beyond the limits of the broad ligament. In my case, not only did it pass far beyond the limits of the broad ligament, but it did not follow the ordinary line of the Wolffian duct between the layers of the broad ligament—it appeared to take a straight course up behind it.

2. A patent unfused right Müllerian duct, representing the undeveloped right half of the uterus and vagina (Fig. 5).

In this case it is possible that the right ovary may have remained in the abdomen somewhere near the suprarenal body, and that the dilated upper end of the primitive duct may have formed the sac, which emptied itself irregularly. The right ovary certainly was never made out in the pelvis. I accounted for it at the time by the hindrance the thickened cellular tissue offered to palpation, but it is quite possible that it was not there to be palpated; and the same remark applies to the right tube. I was not struck by any abnormality in the shape or position of the uterus, but I did not examine with this special object, and as the patient had already borne a child, it is to be presumed that the left half was well developed, and it is possible that no very striking peculiarity in the form of the uterus was present. The onset of the discharge from the cyst may have some bearing here. It was sudden and copious, and, I take it, the result of rupture of the cyst. It is possible that a certain amount of pent-up secretion may have been present since puberty, or may have collected under the stimulus of pregnancy on the developed side, and that in either case suppuration occurred from a vaginal infection after marriage. The early discharge was described by the patient as yellowish or brownish. Possibly rupture occurred first, the discharge then being brown, and infection and suppuration followed.

3. A blind ureter connected with a functionless or rudimentary kidney accompanying or replacing a normal right kidney and ureter (Fig. 6).

The position and direction of the track support this view, as does

possibly its intimate relation to the bladder. This seemed to me the most likely explanation early in the case, and sections of the tube were examined with a view of determining whether the structure were that of the ureter. The presence of muscular tissue does not support the ureter theory against that of either of the primitive ducts, as in all three cases we should expect to find traces of muscular tissue. With regard to lining epithelium none was found. If ever present it had been destroyed by the free suppuration. The pink plicated lining showed the structure of granulation tissue only. The absence of urea from the pus proves only that the rudimentary kidney was from the beginning functionless, and cannot be taken as an argument against this mode of origin, as I at first thought. This theory, perhaps better than either of the others, would account for the pocketing of discharge in the upper reach of the track. No cystoscopic examination was made, so that the presence or absence in addition of a normal ureter on that side remains undecided.

If this explanation be the true one, it would bring the case into line with Conitzer's case alluded to above.

EXPLANATION OF FIGS.

The first three diagrams illustrate the normal development, the last three the possible origin of the vaginal cyst and track.

1. Side View of Bladder, Genito-Urinary Chamber, and Primitive Ducts. Ureter not yet separated from Wolffian Duct.
2. Side View after Separation of Ureter and its Union with Bladder. Lower Part of Genito-Urinary Chamber opened out into Vestibule.
3. Posterior View after Fusion of Müllerian Ducts to form Uterus and Vagina. Ureters shown as still connected with Wolffian Ducts.
4. Posterior View. Normal Adult Condition on Left; persistent Wolffian Duct on right, forming Cyst.
5. Posterior View. Normal Adult Condition on Left; persistent Müllerian Duct on right, forming Cyst. (Expression 'normal adult condition' is not exactly correct.)
6. Posterior View. Normal Adult Condition on Left; degenerated Kidney on Right, Ureter of which is connected with Vagina and forms a Cyst. (There might have been on right side also a normal ureter and kidney.)

EXPLANATION OF LETTERS.

B, Bladder; *EO*, epovarium; *G*, Gartner's duct; *K*, kidney; *M*, Müllerian duct; *O*, ovary; *PO*, parovarium; *U*, uterus; *UT*, ureter; *WD*, Wolffian duct; *WT*, Wolffian tubes; *C*, cyst; *GC*, genito-urinary chamber

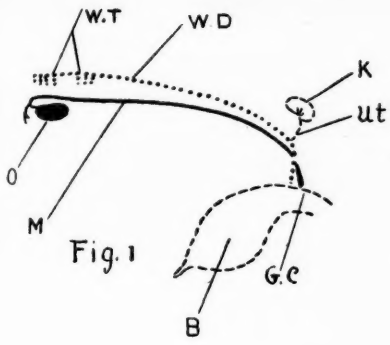

Fig. 1

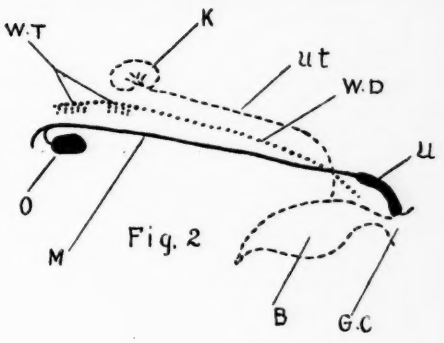

Fig. 2

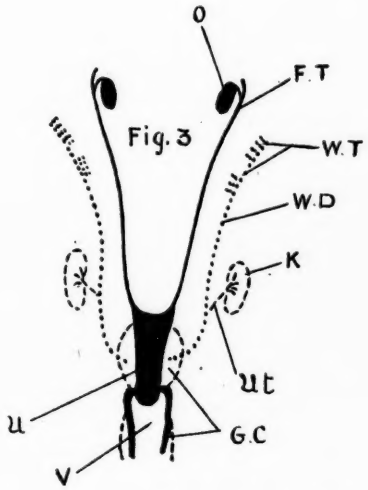

Fig. 3

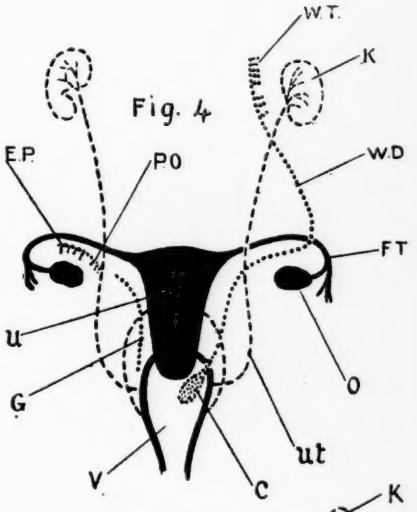

Fig. 4

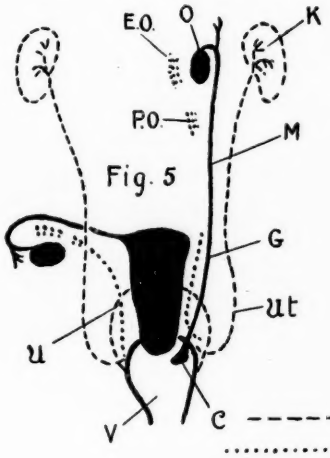

Fig. 5

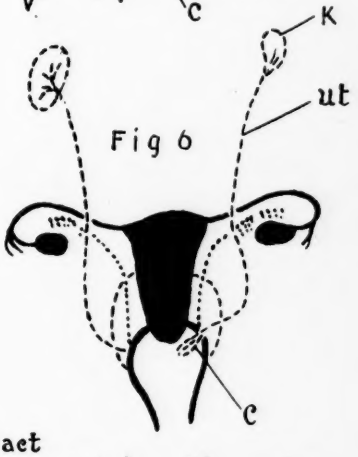

Fig 6

----- Urinary tract

..... Wolffian ducts & tubules with remains

——— Müllers ducts & parts developed from them

OBSERVATIONS ON THE MATERNAL BLOOD AT TERM AND DURING THE PUERPERIUM.

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The subject of this paper is one which attracted my attention while holding the appointment of Outdoor House-Surgeon to the Glasgow Maternity Hospital. It is a subject which so far, and more especially of recent years, has had little attention paid to it, and any investigations hitherto made have been confined almost wholly to the blood of pregnancy, the changes during the puerperium being only casually alluded to. Literature on the subject is very scanty, and is chiefly Continental, most of the observations being of rather a remote date. For this reason, apart from the more recent references, as in the work of Cabot on the blood and a paper by Drs. Elder and Hutchison, this paper must almost perforce be presented on its own merits. The examinations upon which it is based were carried out during the period from December 12, 1900, to the end of February, 1901, upon the indoor patients of the hospital. The cases were not selected in any way, but were simply taken as the intervals in work would allow.

A certain amount of consideration must be given to the class of patients dealt with. The institution is a charitable one, and patients are received from all quarters of the town. The majority, however, are drawn from localities where overcrowding is the rule, cleanliness a thing unknown, and good feeding, or even an approach to it, the exception. Generally speaking, the blood of such patients must be in a condition slightly altered and affected by their environment. It necessarily follows, therefore, that such material is not the best upon which to base a series of calculations to arrive at a normal standard. Allowance must be made for this in reviewing the results, although in many cases it is surprising to find the blood well up to the normal standard where one would not expect it.

The usual term of residence in the hospital is ten days, unless the case has been abnormal and the patient is not in a fit condition to leave at the expiry of that period. For this reason practically all the examinations of the series are confined to the first ten days after

delivery. At first an attempt was made to get the patients to return at later periods for observation, but without success.

As regards the time of examination, it was attempted, so far as possible, to examine the blood at the same hour each day, to get the same conditions of nutrition; but, owing to the irregular nature of the work in the outdoor department of a busy hospital, this was obviously not always possible. In the large majority of the cases the patients were in labour when admitted, so that the initial examination was usually made during the first, or early in the second, stage of labour. Sometimes it was not even possible to get an examination before delivery, but in such cases the first examination was made so soon after—*i.e.*, within a few minutes—that for all practical purposes the result was the same.

With regard to the method of examination, the routine was as follows:

The blood was taken from the lobe of the ear, without pressure, the needle used being that supplied with Gowers' hæmoglobinometer. A fresh specimen was taken for immediate microscopic examination, and films were prepared for staining purposes.

For the estimation of the corpuscles the Thoma-Leitz hæmacytometer was used, and was found to be very satisfactory. The diluting solution for the red corpuscles was the usual one of Gowers', viz., sodium sulphate and acetic acid, while that for the whites was a solution of glacial acetic acid of a strength of one-third of 1 per cent. coloured with a small quantity of gentian violet. In counting the red cells, usually 120 squares were counted, but often this was done in two separate drops to insure more accuracy. For the white cells, two, and often three, drops were counted for the same reason.

For the estimation of the hæmoglobin, Gowers' instrument was used. This instrument is so far unsatisfactory, in that in a series of examinations like the present, one is alternately using it in day and gas light, and thus differences, though slight, may occur. For this reason, and as the results were very uniform up to that point, I latterly discontinued the estimation of hæmoglobin. Oliver's instrument, which is arranged and graduated for use with artificial light at all times, although much more expensive, would give more satisfactory and accurate results.

The films of blood were dried in air, fixed by heat, and stained with Ehrlich's triple stain. At first a few films were also stained with alcoholic eosin and methylene blue, but this method was not so satisfactory for purposes of differentiation, and was therefore discontinued. In fixing with heat it is a great advantage to have a dry-

heat sterilizer, so that the temperature can be accurately regulated, but in the present series the specimens were made simply by passing the cover-glass rapidly through the flame of a spirit-lamp, the rate of speed and the number of exposures to the flame being learned by experience. With a little practice, useful specimens can be prepared in a short time by this method. As regards the staining process itself, it is comparatively simple. The stain is spread over the cover-glass with a glass rod, and is allowed to remain on for two or three minutes, or longer. Cabot states that it is impossible to overstain with this mixture. In my specimens usually two or three minutes was the time allowed, and this gave good results. The chief, and, in fact, the only, difficulty in the process is the heating, as underheating and overheating alike spoil the specimen. After staining and washing in water, the cover-slip is dried between layers of filter-paper, and mounted in Canada balsam.

The paper is based on about 300 examinations of fresh blood, and a similar number of counts of the red and of the white corpuscles, about 150 estimations of hæmoglobin, and 100 stained films differentiated.

Before considering the condition of the blood at term and during the puerperium, it is necessary for purposes of connection to review shortly what is known regarding the blood in pregnancy. On this point Playfair is very concise, and I have quoted largely from his book.

It has long been known that the puerperal state is associated with well-marked changes in the composition of the blood, although there has always been considerable difference of opinion as to the exact nature of these changes. It used to be believed almost universally that pregnancy was, as a rule, associated with a condition analogous to plethora, and that this explained many characteristic phenomena of common occurrence, such as headache, palpitation, shortness of breath, singing in the ears, etc. It was habitual, therefore, to treat pregnant women on an antiphlogistic system, to place them on low diet, administer lowering remedies, and very often to practise venesection. Indeed, the latter mode of treatment was at times adopted to an alarming extent. About twenty years ago the opinion of the profession on this point underwent a remarkable change. It was then recognised, from various careful analyses of the blood, that the view of plethora was not correct. It was found that the total amount of blood in the system is increased to meet the necessities of the largely increased vascular arrangements of the uterus. This was experimentally proved by Spiegelberg and

Gscheidlin to be correct in the case of bitches. The blood was found to be more watery, its serum deficient in albumin, and the amount of coloured globules to be materially diminished. This was pointed out by Becquerel and Rodier, who analyzed the blood in a series of nine cases. They also found the fibrin and extractive matter to be increased in quantity. This is of peculiar importance, and goes far to explain the frequency of certain thrombotic affections observed in connection with pregnancy and delivery. This latter condition is also considerably increased after delivery by the amount of effete matter thrown into the mother's system to be got rid of.

It was thus established that the blood of the pregnant woman is usually in a condition much more nearly approaching that of anæmia than of plethora, and most of the phenomena formerly attributed to plethora were, of course, as easily, if not more easily, explained on this view. The changes, too, are much more marked towards the end of pregnancy than at its commencement, and it is of interest to note that it is then that the concomitant phenomena alluded to are most frequently met with.

One of the chief advocates of this view was Cazeaux, who described the pregnant state as one essentially analogous to chlorosis, and he contended that it should be treated as such. More recently Quinquad pointed out that a progressive fall in the amount of hæmoglobin takes place throughout pregnancy. He accordingly applied to pregnancy the term 'chlorose puerperale.' Still more recently the accurate observations of Willcocks of London have shown that the blood of pregnancy differs from that of chlorosis in the fact that, while in both the amount of hæmoglobin is diminished, in pregnancy the individual corpuscles are not impoverished as they are in chlorosis, but simply lessened in comparative number, owing to increase in the water of the plasma, due to the progressive enlargement of the vascular area during gestation. His assumption is that, if the number and functional value of the red cells of the unimpregnated condition remain constant throughout pregnancy, a progressive dilution of the blood would necessarily ensue, owing to the considerable and progressive enlargement of the vascular area in the puerperal state. Such an assumption at once explains both the diminution in number of the red cells and the diminution in their functional value. This may also explain the enormous loss of blood from which some women suffer during parturition with comparative impunity, the greater serous dilution of the blood allowing the organism to lose a much larger quantity

without injury than in the normal state. These observations of Willcocks appear to point rather to an excessive increase in the fluid of the liquor sanguinis in pregnancy than to a condition of pure anæmia, which is usually considered to coexist with it. In several cases detailed by him where continuous observations were made in two to three months during the course of pregnancy, a slight progressive fall in the number of red corpuscles took place. In this connection Dr. Maurel states that the increase in number of red globules observed as the menstrual period recedes continues when, under the influence of pregnancy, the hæmorrhage is not reproduced. This increase may go on towards the third month, when, under the influence of causes as yet unknown, the number diminishes again, to increase once more towards the seventh month.

Lusk, in his 'Text-book of Midwifery,' describes the condition as one of serous plethora, the red cells, albumin, iron, and salts of the blood being diminished, while the white corpuscles, the fibrin, and, above all, the water of the blood, are increased. He explains these changes partly, at least, by the demands made on the maternal system by the growing fœtus. With increased waste in the organism, as evidenced by an augmentation in the CO_2 and urea eliminated, there is usually diminished capacity to take and assimilate food. How far these causes are operative in producing the above-mentioned conditions is shown by the slight degree of hydræmia, or the entire absence of blood impoverishment, in women, who possess during pregnancy good appetites and excellent digestions, and who at the same time are able to procure an abundance of nutritious food.

Objection has naturally been made to the theory of Cazeaux, on the ground that a healthy and normal physiological function should not be associated with a morbid condition. This naturally raises the question: How many women in the pregnant state can be considered to be perfectly healthy, especially among those in large towns, and from the lower quarters of these towns, from which class our investigations must almost of necessity be derived? Surroundings, civilization, climate, errors of diet, and, indeed, in many cases starvation, or something approaching to it, occupation, exposure to contagion, uncleanliness, and many other conditions, all tend to render perfect health out of the question.

Playfair sums up the question thus: 'Making every allowance, therefore, for the undoubted fact that pregnancy *ought* to be a perfectly healthy condition, it must be conceded, I think, that in the majority of cases coming under our notice it is not entirely so,

and the deductions drawn by Cazeaux from the numerous analyses of the blood of pregnant women seem to point strongly to the conclusion that the general blood state is tending to poverty and anæmia, and that a depressing and antiphlogistic treatment is distinctly contra-indicated.' Newer text-books of midwifery practically repeat these ideas, but give no further information on the subject, and in books on the blood there are only a few casual references to it. Cabot, whose work on the examination of the blood is the most recent, treats specially of the leucocytosis of pregnancy, though not in great detail. His results will be referred to in the course of this paper.

The foregoing represents the state of our knowledge on the blood of pregnancy, and we are now in a position to take up the thread of our subject at this point, viz., the condition of the blood at term and during the puerperium. The sections will be treated as follows:

I. The blood as seen in the fresh specimens.
II. Red corpuscles.
III. Hæmoglobin.
IV. White corpuscles.

I. Examination of Fresh Specimens.—From these, of course, only a general idea can be obtained, but an opinion can be given in each case as to the:

1. Amount of rouleaux formation of the red cells.
2. Deformity of the red cells, if any.
3. Presence of anæmia, or leucocytosis.
4. Amount of fibrin present.

These points were all carefully noted in detail on the report sheets. As regards the red cells in normal cases, no abnormal feature was recognised in the blood at term, although at times there seemed to be a deficiency in the amount of rouleaux formation. During the first two or three days of the puerperium, however, in many cases slight changes in the shape and size of the red cells were noted, pointing to blood regeneration, which, as will be seen later, is taking place during that time. No nucleated red cell was observed during the puerperium in any normal case, but in several other cases, as in a case of syphilis and several cases of eclampsia, such cells were observed.

In the case of the white cells, a leucocytosis was invariably found, although varying considerably in degree in the different cases.

For actual results, the only point upon which the fresh specimens are relied on to supply information is that of the quantity of fibrin present at term. On this point, in the large majority of cases, it is noted that the formation of fibrin was early or excessive, but a few cases showed no tendency towards this, so far as could be seen. No decided statement on this point can therefore be made, although there is considerable evidence from the statistics to prove that in the blood at term there is usually an increased quantity of fibrin. The researches of Becquerel and Rodier on this subject have been already alluded to. In the same article it is stated that, in thirty-four cases examined, Andral and Gavarret found increase of fibrin.

II. Red Corpuscles—1. *At Term.*—In forty-five cases examined just before or immediately after delivery, the counts were found to vary from a minimum of 2,260,000 per cubic millimetre to a maximum of 5,000,000, giving as an average over all 3,906,666 per cubic millimetre. This is, of course, considerably below the number given as the normal for the adult woman—viz., 4,500,000. The minimum count occurred in a case where the patient was, on admission, in a condition resembling in many respects that of pernicious anæmia. Another very low count was in a case where there had been considerable hæmorrhage. These two observations are very much lower than the others, so that to get a more correct normal average they should be excluded. When this is done, the average for the remaining forty-three cases works out at 3,975,348 per cubic millimetre, which is still below the normal standard.

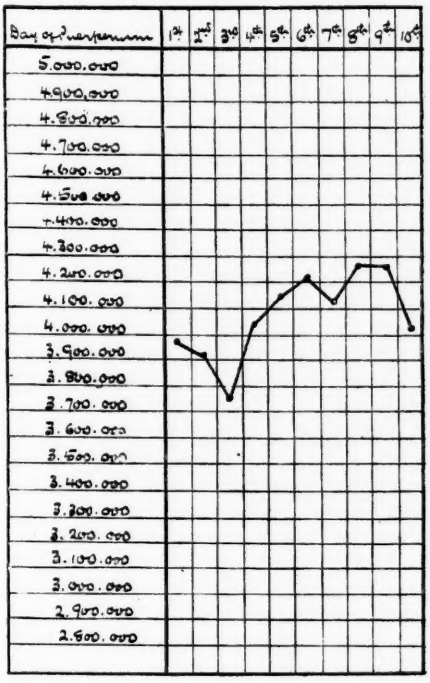
2. *During the Puerperium.*—In almost all the cases, as already stated, the patients were under observation for ten days after delivery. The course of the red corpuscles after delivery is best shown by the following average table, compiled from the examinations made on each day of the puerperium:

1st day,	average of	43	counts,	3,975,348	per cubic millimetre.	
2nd	,,	,,	17	,,	3,912,000	,,
3rd	,,	,,	19	,,	3,757,000	,,
4th	,,	,,	17	,,	4,047,000	,,
5th	,,	,,	19	,,	4,148,000	,,
6th	,,	,,	15	,,	4,208,000	,,
7th	,,	,,	22	,,	4,128,000	,,
8th	,,	,,	14	,,	4,273,000	,,
9th	,,	,,	21	,,	4,270,000	,,
10th	,,	,,	13	,,	4,021,000	,,
11th	,,	,,	4	,,	4,020,000	,,

The first day represents the day of delivery. It will be observed that the average for each day does not represent an equal number of examinations, but nearly all have a sufficient number to allow of a reliable average over all. In this table only those examinations which may be considered strictly normal have been included. This average table is represented diagrammatically in Chart I.

CHART I.

SHOWING THE COURSE OF THE RED CORPUSCLES DURING THE FIRST TEN DAYS AFTER DELIVERY.



This chart is constructed from the averages of 204 counts of red corpuscles.
(See p. 174.)

At Term.—With regard to the quantity of red corpuscles at term, we must, of course, make a slight allowance for what may be called normal variations from the normal, as well as for the condition of the patients coming under observation. When this is done, the average of 3,975,348 does not represent any marked degree of diminution, if, indeed, there is any. At this stage it is interesting to compare this average with that obtained by Drs. Elder and Hutchison, in

a paper published in 1894. In sixteen cases in which they examined the blood at term they found the average number of reds to be 3,978,937 per cubic millimetre, which is a strikingly similar result.

During the Puerperium.—It will be seen from the chart that there is a slight diminution in number of the red corpuscles during the first two days after delivery. Thereafter the course is a steady upward one until the ninth day, when there is a second downward tendency, which continues as far as the examinations go. The temporary diminution after delivery is naturally explained by the loss of blood at childbirth, the amount depending not only on the amount of blood lost, but also on the capacity of the individual organism for blood regeneration. It should be observed here that during these days also in the specimens of fresh blood, changes in size and shape of the red cells were noted, pointing to new formation of red cells. This process is well seen in the chart, but the second downward tendency is more difficult to explain. It is possible that a certain degree of diminution may be continued during lactation, owing to the drain on the maternal system which this process necessitates. Our examinations would point to such being the case, but how long it is continued, or whether it is present all through the period of lactation, we have no data on which to offer an opinion. All that can be said is that the slight diminution persists so far as the examinations show, as of four examinations made on the eleventh day the average is 4,020,000 per cubic millimetre.

These results, though contrary to the older ideas already referred to, are quite in accordance with the general statements of Cabot on the subject. He holds that normal pregnancy does not affect the count of red cells, but that childbirth and lactation cause a temporary diminution.

III. Hæmoglobin—1. *At Term.*—In thirty-seven cases where the amount of hæmoglobin was recorded, the average is 68·2 per cent.; the lowest observation being 45 per cent., while the highest was 80 per cent. The minimum occurred in a case of hæmorrhage which cannot be considered normal, and, as this is the only record below 60 per cent., it should be excluded to get a more correct average. The average for thirty-six cases is then 68·9 per cent.

2. *During the Puerperium.*—In almost all the cases a slight improvement is noticeable under observation, usually about 5 per cent.; but in two cases the increase recorded was 15 per cent. The following averages compiled from the examinations will give an idea as to the

course of affairs, although the records are not sufficiently numerous to give quite a satisfactory average:

1st day,	average of	36	counts	...	...	68·9 per cent.
2nd	,, ,,	8	,,	...	...	73·1 ,,
3rd	,, ,,	7	,,	...	...	73 ,,
4th	,, ,,	6	,,	...	...	70 ,,
5th	,, ,,	7	,,	...	...	73·5 ,,
6th	,, ,,	5	,,	...	...	72 ,,
7th	,, ,,	12	,,	...	...	72·9 ,,
8th	,, ,,	4	,,	...	...	73·75 ,,
9th	,, ,,	9	,,	...	...	75 ,,
10th	,, ,,	8	,,	...	...	74·75 ,,

This represents a steady average increase under observation of 5·85 per cent. This is illustrated by Chart II. Here, also, only normal examinations are included.

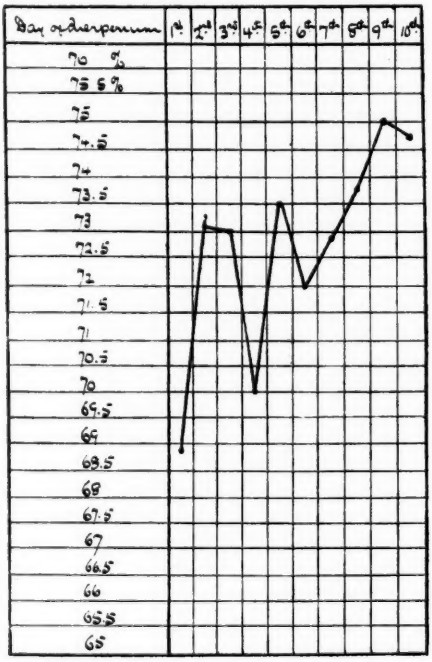
The normal standard of hæmoglobin is one which is very difficult to fix. Of course, with Gowers' instrument 100 is fixed as the normal; but such a standard is rarely, if ever, reached in the adult blood, although in the blood of infants it is usually exceeded. Writers differ as to what may be considered the normal percentage of hæmoglobin. Cabot gives it as his opinion that for a woman a hæmoglobin percentage of 75 per cent. or more means practically normal blood. It is interesting, however, to give the results of A. K. Stone and his assistants on this point. They estimated the hæmoglobin of 189 female patients *who looked anæmic*, and found over 75 per cent. in eighty-nine, or nearly one-half of them. It is obvious, therefore, that, when we use 75 per cent. as the normal, it must be looked upon as the very lowest limit. In any case, however, if we allow 20 per cent., or even 25 per cent., for what may be termed for the present normal deterioration in the richness of the blood in hæmoglobin, there still remains in the present series a deficit to be accounted for, as the average is only 68·9 per cent. Our observations, therefore, point to a distinct, but not marked, reduction in the percentage of hæmoglobin in the blood at term. This is in accordance with the observations of Cazeaux, and the more recent ones of Quinquad and Willcocks, which have already been referred to. In seven cases examined at term, Elder and Hutchison found the hæmoglobin varying from 60 to 83 per cent., giving an average of 72 per cent.

Cabot gives no direct opinion on this point, although he includes pregnancy and lactation as causes of secondary anæmia. He states

that in secondary anæmia it is only comparatively rarely, and in very marked cases, that the diminution in red corpuscles is considerable. The blood characteristic of most cases of secondary anæmia is one in which the number of red cells is approximately normal. The chief changes in such cases are: (1) Lack of colouring matter, and (2) lowering of specific gravity. From this, therefore, we may

CHART II.

SHOWING THE COURSE OF THE HÆMOGLOBIN DURING THE FIRST TEN DAYS AFTER DELIVERY.



This chart is constructed from 102 counts of hæmoglobin. (See p. 177.)

conclude that he recognises a reduction in the amount of hæmoglobin in pregnancy.

Colour Index.—At term, therefore, it appears from our observations that the hæmoglobin is diminished more than the red corpuscles, so that the colour index, or 'valeur globulaire,' is less than one which represents the normal. The colour index at term may be arrived at by taking the average first day count of red cells, viz., 3,975,348 (which represents 88·3 per cent. of the normal 4,500,000),

and dividing this into the average first day percentage of hæmoglobin, thus: $\frac{68{\cdot}9}{88{\cdot}3} = {\cdot}78$. This shows an average deficiency in the colour index at term in the present series of ·22.

IV. White Corpuscles—1. *At Term.*—In thirty-eight cases examined at this period, the average is 21,365 per cubic millimetre, the lowest count being 10,600, while the highest was 36,600. From this average those cases are excluded which, for various reasons, such as the administration of chloroform, etc., were obviously abnormal; but a few cases are included which may not have been strictly normal, but in which there could only be at most a slight variation. This series includes both primiparæ and multiparæ, and in all cases a leucocytosis of varying degree was found. So far as possible, all were examined under the same conditions. Of the thirty-eight cases, thirteen were primiparæ, the average count being 21,969 per cubic millimetre, while twenty-five were multiparæ, the average being 21,052. For all practical purposes, therefore, they may be considered as showing an equal degree of leucocytosis, although the average is slightly greater in primiparæ.

2. *During the Puerperium.*—The course of the leucocytes during this period is shown by the following average table, compiled only from observations which may be regarded as normal:

1st day, average of	38	counts,	21,365	per cubic millimetre.	
2nd	„	„	12	„	17,250	„
3rd	„	„	13	„	17,015	„
4th	„	„	21	„	13,752	„
5th	„	„	21	„	12,276	„
6th	„	„	16	„	11,975	„
7th	„	„	21	„	12,190	„
8th	„	„	17	„	10,147	„
9th	„	„	18	„	11,061	„
10th	„	„	11	„	12,327	„

Chart III. illustrates this table.

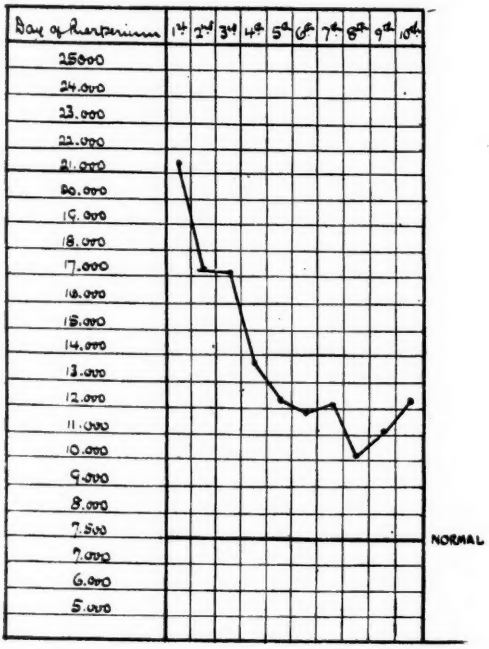
Here, again, it is necessary to establish a normal standard, and on this point also there is considerable difference of opinion. In persons not usually considered as sick, but simply ill-nourished, the normal count of white cells may be as low as 3,000 per cubic millimetre, and for such persons a count of 10,000 would be decidedly pathological. On the other hand, in vigorous and well-nourished people the white cells may rarely fall below 10,000 per cubic millimetre. Of course, to be strictly accurate, one should know the normal count for each individual in health, but it is obvious that

this is impossible in such a series of examinations as the present. It is necessary, therefore, to have some normal standard.

Löwitt considered that 5,000 to 10,000 might be called the normal limits, and showed how a slight shock is sufficient to materially affect the count of leucocytes. Romberg in fifty-five healthy young women found the average to be 9,058 per cubic millimetre. In the present series the normal is put at 7,500 leucocytes per cubic millimetre, which is the figure usually given for adults, and is the

CHART III.

SHOWING THE COURSE OF THE LEUCOCYTES DURING THE FIRST TEN DAYS AFTER DELIVERY.



This chart is constructed from 188 counts of white corpuscles. (See p. 179.)

normal used by Cabot. It is, of course, liable to considerable variation, according to the nutrition of the individual, and also at different times of the day, apart from the influence of digestion, although such variation has not yet been explained.

It is evident, from what literature there is on the subject, that this leucocytosis has been recognised for many years. For instance, so far back as 1854 Moleschott stated that 'the number of colourless corpuscles is greatest in boys and smallest in women, except during menstruation and pregnancy, when it is rather above the average.'

The references, however, in most cases are merely casual, and only a very few writers make any definite statement with regard to the matter. These I have picked out, and will give in detail.

In 1881 Willcocks of London gave statistics of twenty-two cases in which he had counted the white corpuscles. He found the average ratio to be 1 white to 595 red corpuscles, the highest being 1 to 184, and the lowest 1 to 1,650 red cells. The counts, however, were not all made at term, some being considerably earlier. The average ratio in the present series on the first day of the puerperium (*i.e.*, at term) works out at about 1 white to 183 red cells, which is almost equivalent to the highest count of Willcocks. In 1893 Elder and Hutchison, in eleven cases examined at term, found the white corpuscles varying from 8,000 to 25,000, giving an average of 14,522 per cubic millimetre. Presumably, as these writers make no statement to the contrary, their examinations were made in primiparæ and multiparæ without selection.

On this subject Cabot remarks that most primiparæ show during the latter months of pregnancy a moderate increase of all varieties of leucocytes, 13,000 being about the average count, although in the last weeks of pregnancy it increases, until at the beginning of labour it is often 16,000 to 18,000 per cubic millimetre. He further states that this increase occurs in about 50 per cent. of multiparæ. On this point my observations are very definite, as all cases showed leucocytosis, although in varying degree. The lowest counts certainly were all in multiparæ, 10,600 being the minimum, but even this is still well above the normal standard of 7,500 per cubic millimetre. As already pointed out also, the average degree of leucocytosis in the present series is rather higher in primiparæ, although the difference is only very slight.

Cabot gives charts of twelve cases (nine primiparæ and three multiparæ) examined on various days during the puerperium. For the sake of comparison I have worked out his averages for the various days as under :

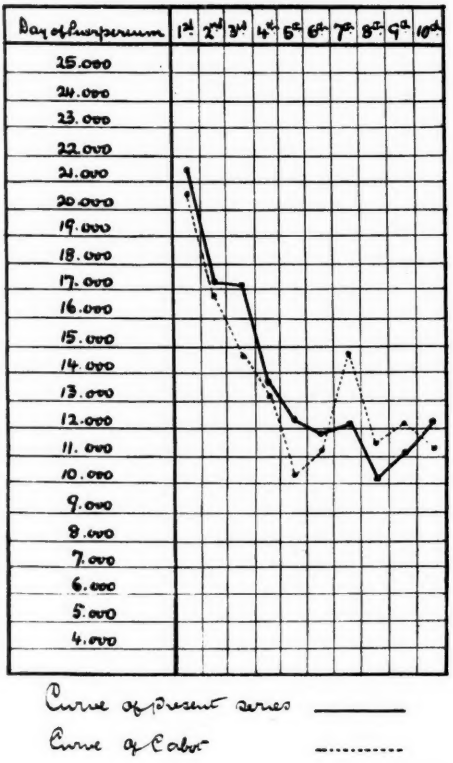
1st	day,	average	of	7	counts,	20,642 per cubic millimetre.
2nd	,,	,,		6	,,	16,833 ,,
3rd	,,	,,		7	,,	14,714 ,,
4th	,,	,,		9	,,	13,111 ,,
5th	,,	,,		6	,,	10,250 ,,
6th	,,	,,		4	,,	11,250 ,,
7th	,,	,,		3	,,	14,833 ,,
8th	,,	,,		5	,,	11,500 ,,
9th	,,	,,		3	,,	12,166 ,,
10th	,,	,,		4	,,	11,250 ,,

Chart IV. is designed to show the marked resemblance between these averages and those of my series.

Further, in comparing my series with that of Cabot, it is necessary to state that in the former seven of the women had dead children, while in the latter all nursed their children. Of the seven cases referred to, three were only examined twice, and one thrice

CHART IV.

SHOWING THE COMPARISON BETWEEN THE AVERAGE LEUCOCYTE CURVE OF THE PRESENT SERIES AND THAT OF CABOT. (See p. 181.)



during the puerperium, so that their inclusion could only have a trifling effect, if any, on the average curve. It is true that in at least one of these cases the number of leucocytes remained abnormally high, but in the others no such condition was found. On this point Elder and Hutchison remark that in six cases examined after delivery the white cells were found considerably decreased, except in one case where the patient did not suckle her child. In this

case they were increased. No definite opinion, however, can be based on an isolated case.

It is probable that the reduction of leucocytes during the first three or four days after delivery is to a certain extent compensated for, and obscured, by a leucocytosis, due to the regeneration of blood following on the hæmorrhage during delivery. Such a leucocytosis usually persists for a day or two.

The reduction in the quantity of leucocytes after delivery is no doubt aided by a good lochial discharge. This point has been investigated by Bonne, who states that the discharges after labour and leucorrhœal discharges cause diminution of the leucocytes. It therefore follows that in cases of puerperal sepsis, where such discharge is suppressed, or, at least, much diminished, the reduction should not be found. This statement is corroborated by the fact that in the only case of sepsis in the present series the leucocyte curve never fell below 18,000 per cubic millimetre during the fortnight she was under observation, and there was no sign of commencing involution of the uterus until the day of dismissal.

With regard to the duration of the leucocytosis after delivery, it is evident, from the observations on the tenth day in my series, that it is prolonged beyond the puerperium into lactation, but how far it may go on I have no data to found an opinion upon. With a view to getting some information on this point, I endeavoured, as already indicated, to get some of the patients to return for observation during lactation, but without success. So far as I am aware, Cabot is the only writer who makes any reference to this point, and he is of opinion that it may go on for several weeks, although he himself has not investigated the point.

Effect of Digestion.—I cannot say much as to the effect of digestion on the leucocytosis of pregnancy, as from the nature of the cases it was rarely possible to have them in hospital long enough before delivery to carry out the required experiment. In only one case was this done satisfactorily, where the patient was brought in for Cæsarean section, and was under observation some days before operation. The blood in this case was examined just before breakfast, and the white corpuscles were found to number 10,200 per cubic millimetre. Two hours after breakfast—*i.e.*, when the digestion leucocytosis, if present, should have been well marked—a second examination was made, and they were found to number 10,400 per cubic millimetre. There was, therefore, no appreciable alteration in this case. The examination was made before breakfast in order to obtain the blood count in that individual when fasting, as during the day the leucocytosis caused

by one meal may not have disappeared before the influence of the next meal begins. In this connection it is necessary to keep in mind that occasionally sound persons are met with who show little or no digestion leucocytosis. Von Limbeck has explained some of these cases by habitual constipation, but in others the reason is more obscure. There is no doubt, however, that after meals of mixed or proteid diet such a leucocytosis is the rule. In herbivorous animals, and presumably in vegetarians, it is not found. Of course, no reliable conclusion can be drawn from an isolated case, but the result detailed above agrees with Cabot's statement that digestion leucocytosis on the top of the constant pregnancy leucocytosis does not occur. This fact is put forward by him as a suggestion as to the causation of the leucocytosis of pregnancy—viz., that the whole thing may be a prolonged digestion leucocytosis, the mother having to eat and digest for two. This will be referred to later in discussing the causation.

With regard to the question of the effect of digestion on the leucocytosis during the puerperium, it would appear from many of my charts that after the fourth to fifth day, when in most cases the leucocytes have reached their minimum or very near it, the influence of digestion is seen. At this point a considerable daily variation in the leucocyte curve appears, apparently depending on the relation of the time of examination to the ingestion of food. It must be remembered, however, in this connection that the number of leucocytes is known to vary at different times of the day in the same individual without obvious cause. In view of this, in one case on the ninth day the leucocytes were counted one and a half hours after dinner, when digestion leucocytosis should normally be present, and were found to be 14,000 per cubic millimetre. Three and a half hours after dinner a second observation revealed the fact that they were reduced to 9,500 per cubic millimetre. In another case, on the ninth day, when the blood was examined at 12.15 a.m., the leucocyte count was found to be abnormally low—namely, 7,400 per cubic millimetre. In this case the patient had tea at 3.30 p.m., and gruel at 7 p.m. the preceding day, but thereafter had no food before examination. The low count is therefore explained by the abstinence from food for at least five hours. The same may be observed in still another case on the seventh day, when under similar conditions the count was found to be 8,800 per cubic millimetre. Other examinations could be cited to illustrate this point, but these will suffice. These illustrations all point pretty clearly in one direction, and it is therefore probable that the influence of digestion on the leucocytes is evident—at least, towards the end of the puerperium.

No reference is made to this point even by Cabot. It may be noted, however, that after the fifth day, on which his lowest average count is made, there are considerable daily variations in the leucocyte curve; but he states that all his cases were examined under the same conditions as regards nutrition, so that the variations in his series cannot be ascribed to any difference in relation to the ingestion of food.

With regard to the varieties of leucocytes taking part in this leucocytosis, the results of my differentiations are pretty uniform. In the process of differentiation I have followed the nomenclature of Cabot, and recognise four varieties:

(1) Polymorphonuclear neutrophile,
(2) Large lymphocyte,
(3) Small lymphocyte,
(4) Eosinophile;

but for all practical purposes classes (2) and (3) may be combined (*vide infra*).

It is necessary before proceeding further to state shortly what is understood by these terms, and in so doing I have followed largely the description given by Cabot:

1. *Polymorphonuclear Neutrophile.*—These cells constitute the vast majority of those found in ordinary pus. They have a very irregular nucleus, which stains deep blue or greenish-blue (usually the former in my experience) with Ehrlich's tri-acid stain, and more deeply in some parts than others. The shape of the nucleus is never exactly the same in any two cells, hence the more correct name, 'polymorphonuclear.' They possess granules which stain best with Ehrlich, although faintly also with eosin, so that they are not strictly accurately named neutrophilic, but are faintly oxyphilic in character. For this reason Kanthack and other English observers have named them 'fine granular oxyphiles,' as opposed to the term 'coarse granular oxyphiles,' usually applied to eosinophiles. The granules stain usually violet or purple with Ehrlich, though in some cases they may be pink, and are small and irregular in shape and size, and lie over around the nucleus.

2 *and* 3. *Large and Small Lymphocytes.*—No definite line of demarcation can be drawn between these, the distinction being pretty much an arbitrary one, so that in my results I do not lay much stress on the percentage of the large as compared with that of the small variety, but rather on the total percentage of lymphocytes present. The small lymphocyte consists of a round blue nucleus about the size of an ordinary red cell, surrounded by a very small

amount of protoplasm, which with Ehrlich's triple stain is almost invisible. In my slides the nucleus is usually very deeply stained, although others have found it pale. The large lymphocyte is larger and paler than the small variety, but its construction is similar.

In many cases the nucleus of the lymphocyte is found to have a deep cut in one side, or, indeed, it may be quite divided, more especially in the small forms. Another transitional variety which I have commonly seen is that where the cell is as big as the larger lymphocytes, and whose nucleus is so indented as to resemble a horseshoe in extreme cases. It is pale all through, even the nucleus being faintly stained. It is evident, therefore, that a few varieties of lymphocyte cannot properly be termed mononuclear. The distinguishing feature is really the absence of granules, and not the presence of a single nucleus.

4. *Eosinophiles.* — These have a polymorphous nucleus and granules. The nucleus is paler than in the neutrophilic cell, and has more of a greenish colour. The nucleus, also, is more loosely connected to the granules which cluster round it, and which are larger than in the polymorphonuclear variety. With Ehrlich's triacid stain the granules are stained a dark-brown or copper colour. These cells are very commonly seen in a broken-up condition in cover-glass preparations, owing probably to their having a looser structure than the other varieties.

The normal percentage of each variety of leucocyte in the blood of the adult is given by Cabot as:

Polymorphonuclear neutrophiles	...	62-70 per cent.
Large lymphocytes	...	4-8 ,,
Small lymphocytes	...	20-30 ,,
Eosinophiles...	...	½-4 ,,

It is frankly owned, however, that these figures are only an approximation to the normal standard, which is necessarily vague and elastic. In reviewing and comparing results this must be allowed for, as, to be thorough, the normal for each individual case should be established, but this, in such a series of examinations as the present, is obviously impossible. The above standard, however, is useful in giving data for a reliable comparison.

In the differentiations at term of thirty-two cases which may be considered to be strictly normal I found the average to be:

Polymorphonuclear neutrophiles	...	78·7 per cent.
Large lymphocytes	...	8·8 ,,
Small lymphocytes	...	10·8 ,,
Eosinophiles	...	1·7 ,,

These results, when compared with the normal standard already given, appear to show a relative increase of the polymorphonuclear variety at the expense of the lymphocytes.

So far as I have been able to find, Cabot is the only writer who makes any statement on this point, and his opinion is that there is a moderate increase of all varieties of leucocytes.

Causation. — Regarding the causation of the leucocytosis of pregnancy, various suggestions have been made, but so far none of them completely explain the condition of affairs. The suggestion of Cabot that the leucocytosis of pregnancy may be only a prolonged digestion leucocytosis, the mother having to eat and digest for two, has been already alluded to, but this, though feasible, does not appear to be thoroughly satisfactory. Normally, there is a digestion leucocytosis of a periodic nature—*i.e.*, dependent on the ingestion of food. It is true that in many cases, especially in persons whose digestion is slow, or who have their meals at very short intervals from one another, the effect of digestion on the leucocytes after one meal has hardly disappeared before the effect of the next meal is seen. In such cases, however, the ingestion of food increases the already existing leucocytosis. In pregnancy there should be practically the same condition. It must be remembered, however, that during pregnancy the maternal blood must be very much richer in nutritious matter than that of the normal adult, and that the fœtus is feeding upon this continuously through the medium of the placenta. The pregnant woman does not, as a rule, eat more than the normal adult woman; indeed, in many cases she eats less food, yet the leucocytosis is still present. Also, even if digestion is constantly going on in the mother, the ingestion of food ought to increase the leucocytosis, although it may be only to a slight extent. It is noteworthy also that, although the pregnant woman during the latter months, and more especially the latter weeks, of pregnancy does not necessarily increase the amount of food ingested, the leucocytosis goes on steadily increasing. It would appear, therefore, that there must be some other cause for this leucocytosis. In favour of this theory of digestion there is the fact brought out in the differentiations at term—viz., that the polymorphonuclear variety of white corpuscles is relatively increased. According to Burian and Schur, in digestion leucocytosis this variety is relatively increased, but so far as can be seen this statement is not corroborated. Cabot merely quotes it, but does not otherwise express an opinion.

The swelling of the breasts with the formation of milk is also mentioned by Cabot as taking part in the causation. This would

naturally cause a gradually increasing, though slight, leucocytosis. In favour of this there is the fact brought out in the examinations—that, after the puerperium, there still remains a modified leucocytosis, which is continued into the period of lactation.

During pregnancy, however, there is increased metabolism in the maternal organism, and this becomes greater with the ever-increasing demands of the growing fœtus. As the fœtus develops, also, there must be from it an increasing amount of waste material thrown off. All this necessitates the presence in the maternal circulation of an ever-increasing amount of effete material, which must be got rid of. This naturally of itself will cause an increase in the number of leucocytes, and it is at least feasible, therefore, that the leucocytosis of pregnancy is chiefly of a toxic nature, increasing with the increased metabolism in mother and fœtus as the pregnancy runs its course, reaching its height at term, then, immediately after delivery, rapidly diminishing when there is no longer any need for it.

It is unfortunate that the leucocytosis of pregnancy has little or no diagnostic value, as in the early months of pregnancy, when diagnosis is difficult, or even impossible, it is not present. In the latter months, also, according to Cabot, such conditions as hydatidiform mole and fibroid tumours may raise the count of white cells as much as pregnancy.

The leucocytosis during the puerperium is of importance from at least one point of view, that it might be confounded with a pathological leucocytosis in a case suspected of being septic.

The maternal blood at term, therefore, shows changes which are characteristic of a mild case of secondary anæmia, there being a considerable reduction in the amount of hæmoglobin present, with but little change in number or appearance of the red corpuscles. This condition is naturally explained by the fact that during pregnancy there is a long-continued drain on the albuminous constituents of the blood for the nourishment of the fœtus. In addition, there is a decided leucocytosis present. Before the end of the puerperal period, however, the blood in normal cases has almost returned to its condition in the unimpregnated state.

I have constructed a composite chart (No. V.), which shows at a glance the course of the red corpuscles, white corpuscles, and hæmoglobin from delivery until the end of the tenth day thereafter.

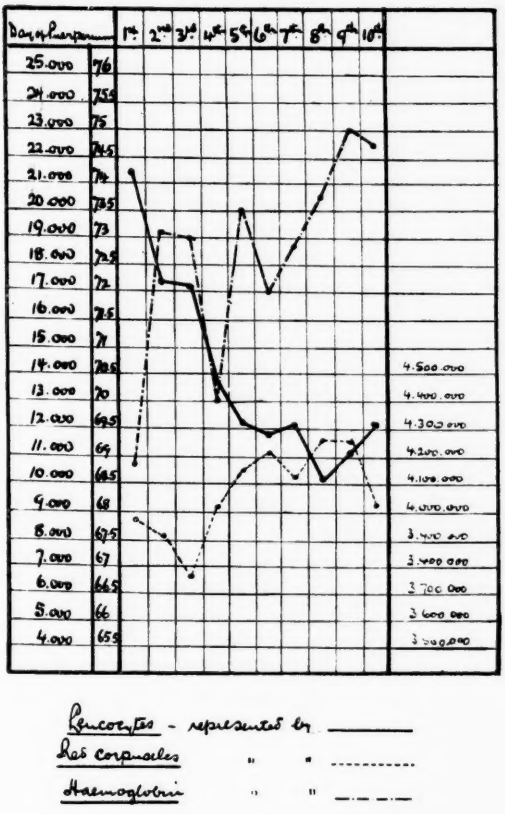
The Effect of Plural Pregnancy on the Maternal Blood.—I find no record of the blood examination in a case where there was more than one fœtus, but one case of twins which is included in my series raises

this question. It is natural to suppose that if one fœtus *in utero* causes a leucocytosis, two or more will cause a greater increase. In this case, however, it is found that the leucocytosis is considerably below the average at term, being only 13,000 per cubic millimetre. This

CHART V.

Composite.

SHOWING THE COURSE TAKEN BY THE LEUCOCYTES, HÆMOGLOBIN, AND RED CORPUSCLES DURING THE FIRST TEN DAYS AFTER DELIVERY, BASED UPON THE AVERAGES GIVEN IN THE TEXT. (See p. 188.)



Leucocytes - represented by _____
Red corpuscles " " ----------
Haemoglobin " " — — —

may possibly be explained by the fact that before admission to the hospital she had been drinking heavily for some weeks, and presumably, therefore, she had not had much in the way of ordinary diet during that period. The influence of fasting on the leucocyte count must, therefore, be taken into consideration. Luciani gives par-

ticulars of the blood of Succi, the professional faster, during a thirty days' abstinence. Von Limbeck also records 2,800 white cells in the blood of a patient who had fasted for a week. In both these cases the white corpuscles were found to be much diminished. It has also been established that fasting, by concentrating the blood, temporarily increases the red cells. In my case the red cells at term are recorded as 4,800,000, which is quite above that of the normal adult blood. Unfortunately, I have been unable to get another case of plural birth in which to investigate this point, so that meantime this case must stand by itself.

The Influence of the Sex of the Child on the Maternal Blood.—It is only natural to suppose that some such influence should exist, although, probably, only in very slight degree. Hough in 1884 published a long article on the relative influence of the sex of the fœtus *in utero* on the mental, physical, pathological, and developmental condition of the mother during gestation, lactation, and subsequently. He states that, according to the sex of the fœtus, there is some diversity in the general mutations of the female body. Andral has stated that the blood in pregnancy shows a remarkable tendency to assume the character of the blood of inflammation, but whether that change is greater in proportion or different in nature when a male fœtus is carried we do not know. It may, however, be inferred that as the proportion of various substances in the blood differs in adults according to sex, it is, therefore, probable that the greater diversity or less watery condition of the blood in the male fœtus determines in the mother the production of more fibrin.

On this point my observations cannot go very far, as in almost all—or, at least, in the great majority—of my cases I observed early formation of fibrin, pointing to excess in the blood. The red corpuscles and hæmoglobin do not show any such variation, but the behaviour of the white corpuscles is worthy of note. In investigating this point I have excluded all cases which were in any way abnormal, and I find that in thirteen cases where there was a female fœtus the average count of leucocytes at term was 23,384; while in eighteen cases where the fœtus was a male the average was 18,355. The latter average is perhaps even higher than it should be, as in four of the cases a certain amount of the leucocytosis might be caused by excitement, which is specially noted as being excessive. The average for the remaining fourteen cases works out at 16,685 per cubic millimetre. Of the female cases the lowest count was 14,800 (which is not much below the average male) and the highest 47,000; while of the male cases the minimum was 10,600 and the maximum

31,400. It is noteworthy that this count is the only one of the male cases which exceeded 24,600, which is only slightly above the average female count. I do not hold for a moment that this should be used as a means of diagnosing the sex of the child before delivery, because, as seen even in the limited number of cases in the series, there are exceptions on both sides. My attention, however, was drawn early in the series to the fact that with a male child there appeared to be a smaller leucocytosis than with a female, and it certainly was remarkable how often thereafter I was able to give a correct opinion before delivery as to the sex of the child. A very large number of cases would require to be examined before any definite statement could be made on this subject. I have no doubt that it would prove to be as correct a method as that of counting the fœtal heart-beats, but, like it, it is a point which is more curious than practical, and is not worthy of further discussion.

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[Some of the above references I have not been able to verify in their original source, but in these cases I have stated the author who has quoted them.]

CRITICAL REVIEW.

THE TOXÆMIC THEORY OF PREGNANCY AND ITS DISORDERS: A CRITICISM OF THE EXPERIMENTAL EVIDENCE.

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Observations upon the toxæmia of pregnancy all owe their inception to the work of Bouchard, who published in 1887 his 'Léçons sur les Auto-Intoxications.' His view was that in health the blood and other tissues of the body contained toxic substances of various kinds, partly introduced with the food, and partly produced within the body itself by the digestive processes and by general tissue metabolism. These toxic substances were disposed of by excretion, and left the body through the urine, fæces, sweat, and expired air. The condition of health depended upon a nicely balanced adjustment of the production and excretion of toxic substances; any increase of the former or diminution of the latter produced a condition of toxæmia or auto-intoxication. Bouchard regarded the excretions as an index of the toxicity of the blood and body tissues generally. While toxic substances were being freely excreted, the toxicity of the excretions would be high, while that of the blood would be low; if the excretion of toxic substances fell below the requirements of the organism, the toxicity of the blood would increase, resulting in the production of toxæmia. If this condition arose solely from failure of the excretory organs to eliminate the toxic substances from the body to the normal extent, toxæmia would be accompanied by reduced toxicity of the excretions. In this case the degree of toxicity of the blood would be inversely proportional to that of the excretions. An increased production of toxins might, however, result in an increased toxicity, both of the blood and the excretions, if the excretory organs retained their normal activity; in this case there would be no serious accumulation of toxins in the blood.

It appears at first sight that Bouchard's theory, if correct, would be readily capable of experimental proof. This was evident to the author and his co-workers, and the line they adopted was an attempt to estimate the degree of toxicity of the excretions under normal and

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abnormal conditions, and to determine, if possible, the nature of the substances to whose presence their toxicity was due. The theory was hailed with enthusiasm in France, and a large amount of experimental work upon these lines has been published upon the Continent, chiefly by French observers. The purpose of the present paper is to examine this experimental work and the conclusions drawn from it, in order to estimate the value of the experimental data by which it is now extensively claimed that the toxæmic theory of pregnancy and its disorders is established.

Obviously, the urine offered the most convenient medium for studying the toxicity of the excretions, and it has been largely used by Bouchard and the numerous observers who have followed his lead. The method adopted by Bouchard was that of direct injection into the circulation; it was pumped with a syringe or allowed to run by hydrostatic pressure into the auricular vein of a rabbit. The amount required to produce death in this manner was called the *urotoxic dose*, and was worked out in cubic centimetres per kilogramme. No precautions were used by Bouchard to collect the urine aseptically, or even by catheter; it was not used immediately, before decomposition could occur, nor was any attempt made to preserve it from bacterial contamination. Indeed, he appears to attach no importance to such precautions, for he speaks of employing urine opalescent from bacteria in his experiments,* and argues that although such urine, if injected under the skin, would cause sepsis, when injected into a vein it does no harm. The only precautions he did take were to filter the urine and carefully neutralize its acidity with bicarbonate of soda. In his later experiments the total urine of twenty-four hours was collected, and its toxicity defined in terms of the *urotoxic coefficient*, a figure obtained by dividing the total for twenty-four hours by the weight of the individual multiplied by the urotoxic dose. Thus, if a healthy individual of average weight (65 kilogrammes) secretes 1,200 c.c. of urine in twenty-four hours, of which 40 c.c. is the urotoxic dose, then the urotoxic coefficient is $\frac{1200}{40\times65}=\cdot46$. Urine of high toxicity gives a small urotoxic dose, but a high urotoxic coefficient; urine of low toxicity gives a large urotoxic dose, but a low urotoxic coefficient. Very few of the observers who followed Bouchard have worked out the urotoxic coefficient, so that for convenience of comparison their results will be stated in terms of the urotoxic dose.

The objections to such methods of experiment will be sufficiently obvious. Considerable quantities of a cold fluid injected none too carefully directly into the circulation of a rabbit might be expected

* Bouchard, *loc. cit.*, p. 28.

to kill even if it contained no 'toxic' substances. Indeed, Bouchard found that distilled water thus injected in a dose of 122 c.c. per kilogramme caused death. It is curious that, in some of the experiments to be noticed later, the amount of urine injected actually approached, or even exceeded, this figure; the importance of eliminating this source of error being insufficiently appreciated by some observers. The few observers who examined the bodies of the dead animals after their experiments sometimes found considerable thrombosis in the venous system and right heart, so that asphyxia produced mechanically may have been another disturbing factor in the results.

One consideration of the first importance has been overlooked by almost all observers—viz., the fact that urine is not a sterile fluid when it leaves the body, and that it is invaded with extreme rapidity by micro-organisms when exposed to the air. By the methods indicated above a highly septic fluid might often be employed, and in any case its sterility could not for a moment be relied upon. It is little wonder that rabbits sometimes succumbed to small doses of such fluid, and that instances occasionally occurred in which the urine appeared to be quite innocuous. Without any reference to 'toxic' substances, variations such as these could be readily explained by varying degrees of bacterial changes.

Another point to be borne in mind is that the body fluids of a certain animal may be toxic to an animal of a different class without being in any way harmful to the animal itself. One of the observers to be referred to later found that animals could be killed by introducing into their bodies small doses of the blood or blood-serum of perfectly healthy animals of a different class. It is very doubtful whether this fact can rightly be held to prove the existence of a condition of 'auto-intoxication.'

In order to show the present position of the question in the clearest manner possible, a short account of the experimental stages through which it has passed will be given, with a concurrent attempt to point out the extent to which the experimental results appear to be worthy of reliance being placed upon them.

It was Tarnier who first perceived the great promise of usefulness offered by Bouchard's theory in connection with the many unsolved problems of the pathology of pregnancy, and he seized upon eclampsia as a test question. If it could be proved that eclampsia was due to the accumulation of toxins in the blood, a foundation would at once be laid for a rational and consistent scheme of prevention and treatment.

Tarnier's first observations were upon the toxicity of the urine in normal pregnancy and were reported to the Académie de

Médecine in 1890.* Accepting Bouchard's statement that the urotoxic dose of the urine of a healthy adult was 45 c.c., he found from the investigation of the urine of three pregnant women that the urotoxic dose in pregnancy was considerably greater than this—in other words, the toxicity of the urine in pregnancy was diminished. Similar results were obtained by his pupils Chambrelent and Démont,† who two years later published observations on six pregnant and four non-pregnant women. They found that on taking the average, the urotoxic dose in the non-pregnant was 38 c.c., and in the pregnant 75 c.c.—a very distinct diminution in toxicity. The most remarkable thing about their results was the extraordinary variations they found in the urotoxic dose: among the six pregnant women the urotoxic dose was in one instance 50 c.c., while in two others a dose of 120 c.c. produced no effect; *i.e.*, the urine was innocuous. The calculation of an average dose from such data certainly appears to be unwarrantable. To the experimental methods of these observers most of the objections previously noted may be urged. They collected the urine of twenty-four hours, filtered it, and tested it for albumin; no other precautions were taken.

In the same year—1892—some observations upon the toxicity of urine during labour and the puerperium were published by Goria‡ The results he arrived at are startling when compared with the average formulated by Tarnier and his pupils, for he found that the urotoxic dose early in labour was 107·45 c.c. (average of seven cases), and on the first day of the puerperium 93·44 c.c. (average of four cases). The reason is probably to be found in the fact that Goria employed warm urine for his injections, and took the precaution to sterilize it and neutralize its acidity before using it in his experiments. In this way he robbed it of much of its so-called 'toxicity.' I have been unable to find access to Goria's original paper, so that I can express no opinion upon the adequacy of the methods of sterilization employed by him. But it is clear that the careful preparation of the urine which he carried out greatly reduced its toxicity. Like Tarnier and his pupils, Goria employed rabbits for his experiments, and injected the urine slowly into the auricular vein. Besides Goria, no one up to this time had employed for their experiments the urine of parturient women, so that in this respect the comparison of results is not level. It is conceivable that an extreme degree of polyuria during labour, by dilution of the poison, might increase the urotoxic

* 'Comptes rendus de l'Académie de Médecine,' Paris, 1890.

† 'Comptes rendus de la Société de Biologie de Paris,' 1892.

‡ 'La Tossicita delle Urine primo e dopo il Travaglio del Parto,' 1892.

dose to a very high figure, but Goria makes no mention of such a condition, and it could hardly have occurred in each of the eleven cases he experimented upon.

Chambrelent's results were to some extent confirmed by Blanc* in 1893, who published a series of experiments upon the toxicity of the urine in thirteen cases of pregnancy, and eight cases in the first week of the puerperium. He experimented upon rabbits, and employed warm, filtered, non-albuminous urine, neutralized with standardized solution of soda, which he slowly injected under a constant pressure of 50 centimetres. He found the average urotoxic dose in pregnancy to be 76 c.c. per kilogramme, and in the puerperium 50 c.c. per kilogramme. These figures, although somewhat higher than those obtained by Chambrelent and Démont, are much lower than Goria's, the average figure for the puerperium—50 c.c.—being not greatly in excess of Bouchard's normal urotoxic dose—viz., 45 c.c. A noteworthy feature of his results is the wide variations he found in the toxic dose; this varied in the case of the non-pregnant from 38 c.c. to 65 c.c., and in the pregnant from 30 c.c. to 114 c.c.

Goria and Blanc agree in the fact that they found an increase in toxicity when labour was over. It is important to notice that in one point the method of Blanc differs from that made use of by Goria—viz., that he did not sterilize the urine. How much this omission may have affected his results it is impossible to say, but the point is a suggestive one. It is only fair to add that in a later series of experiments Blanc arrived at the opposite conclusion—viz., that the toxicity of the urine is not diminished in pregnancy. Too much importance must, therefore, not be laid upon his first series of cases.

Another step in the experimental evidence was taken in 1896 by Labadie-Lagrave,† who investigated the toxicity of the urine in twenty-three cases taken from various periods of pregnancy and the puerperium. He claimed to have proved that there is a progressive diminution in the toxicity of the urine during the first three months of pregnancy, after which it remains stationary until term. At the second month he found the urotoxic dose was about 55 c.c., and at the third month 75 c.c. After labour the toxicity slowly increases, reaching its maximum in about two months. No details of the method of experimenting are given by this observer, his paper consisting merely of a statement of the conclusions to which his experimental results had led him.

* 'De la Toxicité urinaire chez la Femme enceinte' (*Ann. de Gyn. et d'Obstét.*, 1891 and 1893).

† 'Comptes rendus de la Société de Biologie de Paris,' December, 1896.

In 1895 an important series of experiments was published by Ludwig and Savor* upon the toxicity of the urine in normal pregnancy and in eclampsia. The experimental methods of these observers were open to less objection than those of many previous ones. The urine was collected with 'aseptic precautions,' and was either used at once or kept upon ice until required. No mention is, however, made of neutralization or warming being employed. From the nature of the cases investigated, it was not practicable to collect the urine of twenty-four hours in the majority of instances. Injection was made under narcosis, and special care was taken to prevent the entrance of air into the circulation. It will be therefore seen that, although open to less objection than some, the methods of these observers still failed to fulfil the required conditions.

In four experiments they found that the urotoxic dose of normal pregnancy averaged 63 c.c.; no observations were made upon the urine of non-pregnant women, Bouchard's figure of 45 c.c. being accepted. A series of sixty-seven observations upon the toxicity of the urine in sixteen cases of eclampsia is then recorded. These observations can best be understood when divided into two groups: (1) Observations upon urine taken during the convulsive stage; (2) observations upon urine taken within forty-eight hours after the convulsive stage. Calculating the average in these groups, as was done by previous observers, we find that the urotoxic dose during the convulsive stage was 36 c.c. per kilogramme, and during the first forty-eight hours after convulsions had ceased 43 c.c. per kilogramme. Here again very wide variations are found; in group (1) the dose varied from 6 c.c. to 75 c.c., and in group (2) from 6 c.c. to 77 c.c. The only other observations with which these results can be compared are those of Goria,† Tarnier, and Chambrelent.‡ Goria found that the average urotoxic dose during normal labour was 107·45 c.c., and on the first day of the puerperium 93·44 c.c.—a much lower toxicity in normal cases than Ludwig and Savor found in their cases of eclampsia. It must be borne in mind, however, that Goria sterilized the urine before injecting it, while Ludwig and Savor did not; the comparison is, therefore, not altogether a fair one. Tarnier and Chambrelent, experimenting upon the urine of six cases of eclampsia, found the urotoxic dose to be from 100 c.c. to 118 c.c. per kilogramme on the first day of the puerperium. They concluded

* 'Experimentelle Studien zur Pathogenese der Eklampsie' (*Monats. für Geburts. und Gynäk.*, Bd. I., p. 447).

† *Loc. cit.*

‡ 'Comptes rendus de la Société de Biologie de Paris,' 1892.

that the toxicity of the urine in eclampsia was extremely low, comparing it as they did with their results in normal pregnancy, and this supported their view that in eclampsia there was an accumulation of toxic matters in the blood. But clearly, if the results of Goria are reliable, there is little difference between the toxicity of the urine in the normal puerperium and that of eclampsia as estimated by them. On the other hand, there is the widest discrepancy between the results as regards eclampsia obtained by Tarnier and Chambrelent and Ludwig and Savor respectively. It is much to be regretted that none of these observers made a series of observations upon the urine in normal labour with which their results in cases of eclampsia could be justly compared. The need for control experiments is very great indeed upon this point.

After what has been said, it will cause some surprise that Ludwig and Savor should deduce from their experimental results the conclusion that the toxicity of the urine is never over the normal during the convulsive stage of eclampsia, but rises markedly when the convulsions are over. This conclusion seems by no means warranted by the data given by themselves.

In 1897 Volhard* published a piece of excellent experimental work, which he had been induced to undertake from dissatisfaction with the results obtained by Ludwig and Savor. His methods did not materially differ from those usually employed, except that he took great pains to inject the urine slowly and under constant pressure, selecting in all cases the jugular instead of the auricular vein. He makes no mention of any attempt to preserve the urine from contamination, or even to secure its being used in a fresh state, and does not appear, like Ludwig and Savor, to have warmed it or neutralized its acidity. In two cases of normal pregnancy he found astounding differences in toxicity; in the first the urotoxic dose was 245 c.c. per kilogramme, in the second 23·6 c.c. The total amount of urine passed by the second patient in twenty-four hours was 455 c.c., while that of the first was nearly four times as great—namely, 1,750 c.c. If allowance be made for this difference in dilution, the difference in toxicity is not so striking, being 61·2 c.c. in the first, and 23·6 c.c. in the second. A very suggestive observation upon the second case was made by Volhard, the significance of which he scarcely appreciated; viz., after boiling the urine he found the toxic dose increased from 23·6 c.c. to 44·4 c.c. This diminution in toxicity may be presumed to be the effect of sterilization. It must be said,

* 'Experimentelle und kritische Studien zur Pathogenese der Eklampsie' (*Monats. für Geburts. und Gynäk.*, Bd. v., p. 411).

however, that in a third experiment with the same urine he found that, by reducing the rapidity of the injection to one-half, nearly the same result was obtained as after boiling the urine. The average of seven experiments on the urine of normal pregnancy gave a urotoxic dose of 94·7 c.c. per kilogramme, with individual variations from 23·6 c.c. to 245 c.c. per kilogramme. A surprising incident in his results was that in two cases the urine of non-pregnant women gave an average urotoxic dose of 87·5 c.c. per kilogramme—a very much higher figure than that of Bouchard, which had been accepted as correct by most observers who preceded Volhard. Indeed, this observer appears to be the only one who thought it worth while to control his results by testing the urine of non-pregnant women.

The results he obtained from experiments upon the urine of five cases of eclampsia were almost equally contradictory. The minimum urotoxic dose was 7·4 c.c. per kilogramme; in this case the urine was withdrawn by catheter twelve hours after labour; in another case 55 c.c. per kilogramme of the urine of the first day of the puerperium produced no effect whatever upon the animal. The results obtained by injecting the same specimen of urine into three different rabbits were almost hopelessly perplexing. The first rabbit died after receiving 7·4 c.c. per kilogramme; the second received 42·7 c.c. per kilogramme without any ill effects; the third died after receiving 32 c.c. per kilogramme. It is unnecessary to go into further detail; probably the resistance offered by individual rabbits to this particular form of poisoning varies very greatly, and thus another disturbing factor is introduced into an already discredited method of experimentation.

The *coup de grâce* to the method of estimating the toxicity of urine by intravenous injection may be said to have been administered by Stewart. This writer's first observations were published in 1897,* and were undertaken to especially test the question: 'Were the results obtained by Bouchard, Tarnier and Chambrelent, and others due to contamination of the urine with micro-organisms?'

In his first series of experiments he collected the urine of women in the last month of pregnancy or in the puerperium, passed naturally into glass jars, the patients being cautioned as to the necessity for strict personal cleanliness. In each jar was placed 2 drachms of boric acid. The urine of twenty-four hours having been collected, part of it was concentrated by boiling to one half or one third of its bulk, and part was used unboiled. The injections were made under strict antiseptic precautions into the peritoneal cavity of mice and rabbits, instead of

* *Amer. Journ. of Obstet.*, 1897, p. 339.

into the veins. Stewart believed this method to be open to much less objection than the older one, such accidents as air embolism and extensive clotting in the veins being thus avoided. The urine was warmed to about 100° F. before injection, but more care was exercised in preventing contamination than in attaining a precise temperature. By this method he came to the conclusion that the urine of both pregnant and non-pregnant women was highly toxic.

Being unsatisfied with the results obtained by this method, Stewart published a second series of experiments in 1899.* In this series he collected the urine by catheter under strict asepsis, received it into sterilized flasks which were immediately cotton-stoppered, and in some cases boiled (time not stated), in others not boiled. Urine thus collected was either injected at once intraperitoneally, or kept in the stoppered flasks for twelve, twenty-four, or forty-eight hours before being injected. The results thus obtained are very striking, for he found that fresh unboiled urine used at once caused death in only 20 per cent., although employed in doses which in the first series of experiments resulted in a mortality of 100 per cent. Fresh boiled urine he found was innocuous. Stale urine—*i.e.*, urine kept for twenty-four hours or more before being injected—gave a mortality of 100 per cent. Stewart thought, however, that stale boiled urine was slightly less toxic than stale unboiled urine. The outstanding fact of these experiments is that fresh urine collected under strict aseptic precautions and boiled is innocuous, and that stale urine is highly toxic, the degree of toxicity increasing with age.

In a third series of experiments,† Stewart repeated his observations with the addition that a bacteriological examination of the injected urine was made in every case to determine the presence or absence of active micro-organisms. He now found that boiled urine, whether fresh or stale, showed no toxicity. In the result he succeeded in cultivating colonies of micro-organisms from the urine in practically every instance in which it proved to be toxic. And further, examination of the bodies of the dead animals convinced Stewart that death was in every instance due to septicæmia, active bacilli being found in the blood of the animals in practically every case.

Stewart's conclusions are as follows:

1. Urine passed naturally contains a convulsive poison lethal to rabbits and mice.

* *Amer. Journ. of Obstet.*, 1899, p. 345.
† *Ibid.*, November, 1901.

2. Urine drawn by catheter under strict asepsis and immediately boiled is innocuous.

3. If stale unboiled urine is used the toxicity rises rapidly with the age of the specimen.

4. All specimens of fresh urine which caused death contained micro-organisms at the time of the injection.

From these observations we may safely conclude that the results of other observers who failed to employ the careful asepsis indicated by Stewart are vitiated beyond remedy. The toxicity of urine is due, not so much to toxic substances produced within the body and excreted through the kidneys, as to contamination of the urine during its evacuation or afterwards by exposure to atmospheric and other sources of contagion. The only serious objection that can be taken to Stewart's method is that possibly the toxic bodies which the urine contained may have been destroyed by boiling. But in view of the fact that merely collecting the urine under strict asepsis diminishes its toxicity to one-fifth strongly suggests that contamination is the real source of the toxicity, and this is confirmed by the bacteriological evidence of the cause of death. In any case, Stewart's results make it absolutely necessary that the whole question of the toxicity of the urine should be completely revised.

It will thus be seen that the attempt to prove that there is a toxæmia of pregnancy by estimating the toxicity of the urine has broken down in a singularly complete and conclusive manner, for it has been shown that the toxicity of the urine of pregnancy is due to decomposition and contamination. Stewart's observations were practically confined to pregnant and parturient women. It is much to be desired that his experiments should be repeated upon men and non-pregnant women, for if such experiments should confirm his results, the whole question of the toxicity of this excretion must be approached with an open mind.

Experimental proof of the toxæmic theory has, however, been sought for in one or two other directions. Of these, the most important is the attempt to prove that *the toxicity of the blood in normal pregnancy is increased.* Previous to this attempt, some observations had been made upon cases of eclampsia which seemed to show that in that condition there was a distinctly toxic state of the blood. The first observers whom I have been able to follow into this field were Doléris and Butte,* who in 1886 published some observations which they had made upon five cases of eclampsia. They succeeded by a process which need not be detailed, in

* 'Comptes rendus de la Société de Biologie de Paris,' 1886.

separating from the blood in these cases a crystalline inorganic substance which, when injected in dilute solution under the skin of rabbits, rats, and sparrows, caused death with convulsions. From this they concluded that in eclampsia the blood contained a convulsive poison, and that the disease was therefore due to a kind of auto-intoxication produced by bodies analogous to ptomaines. This line of investigation appears to be a promising one, and it is not a little strange that none of the later observers followed the methods of Doléris and Butte.

No further observations appear to have been made until Tarnier and his pupils took up the subject in 1890;* but their methods were quite different from those of Doléris and Butte. Their observations were also made upon cases of eclampsia, but they injected blood-serum directly into the auricular veins of rabbits, and made no attempt to separate toxic principles from the blood. The blood was obtained by venesection, and the serum allowed to separate by standing; no serious attempt was made to collect the blood under asepsis, or to preserve it from bacterial contamination. This is a serious flaw in the method, for no fluid is more prone to become the home of micro-organisms than blood-serum. Many observations were made in this way in cases of eclampsia, but very few control experiments were made upon healthy pregnant women or upon healthy males or non-pregnant women. Yet the value of such observations depends entirely upon the previous determination of the standard toxicity of the blood in normal pregnancy and in health. When Tarnier and Chambrelent published their first paper, the only observation upon which they could rely for a standard of health was that of Rummo,† who estimated the toxicity of human blood-serum in health at 10 c.c. per kilogramme (rabbit). In 1892 and 1893 other observations were made by Charrin,‡ and Leclainché and Rémond.§ Between them they made four experiments, and estimated the toxicity of normal blood-serum at 23 c.c. and 27 c.c. respectively. Tarnier and Chambrelent had found the toxicity in their cases of eclampsia to be 4·3 c.c. per kilogramme in one instance, and 3·4 c.c. per kilogramme in the other. They therefore felt justified in concluding that, as compared with conditions of health (non-pregnant), the blood

* Charrin: 'Comptes rendus de la Société de Biologie de Paris,' 1890; Tarnier and Chambrelent: *ibid.*, 1892.

† 'Ueber die Giftigkeit des Blutserums von Menschen' (*Wiener Med. Woch.*, 1891).

‡ *Archiv. de Physiologie*, 1892.

§ 'Comptes rendus de la Société de Biologie de Paris,' 1891 and 1893.

of cases of eclampsia showed a great increase in toxicity. In 1890* Charrin found the toxicity in one case of eclampsia represented by 23 c.c. per kilogramme, a degree of toxicity below that of health as estimated by Rummo. This observation therefore directly contravenes those of Tarnier and Chambrelent. From the wide variations in the toxicity of normal blood-serum as estimated by Rummo, Charrin, and Leclainché and Rémond, it is evident that conclusions drawn from observations upon a small number of cases of eclampsia must be received with caution.

In 1894 Mairet and Bosc† published an elaborate series of experiments designed to settle the all-important question of the standard toxicity of normal human blood-serum. In a series of seven experiments upon rabbits they found that less than 12·5 c.c. per kilogramme did not once cause death, the minimum lethal dose varying from 12·5 c.c. to 18·5 c.c. per kilogramme. On post-mortem examination of the bodies of the animals, however, these observers found extensive coagulation of blood in the right heart and pulmonary artery; the mechanical result of this condition would infallibly be arrest of the pulmonary circulation and non-aeration of the blood, so that asphyxia was at any rate one important factor in the causation of death. This coagulation they attributed to the effect of the coagulative ferment contained in the serum, upon the blood. By a series of experiments with dog's blood they next endeavoured to determine whether, after the elimination of the coagulative principles the serum retained its toxicity. Their conclusions upon this point are quite definite. Without entering into details with regard to their methods of experiment, it may be stated that they found (*a*) that precipitation and removal of the coagulative elements of the blood largely diminished the toxicity, (*b*) that by a special process an albuminoid body could be separated from the blood, which when injected into the circulation of rabbits caused death without coagulation of blood. This non-coagulative toxic substance they called a toxin. They therefore came to regard intravenous injection of blood-serum as an unsuitable method of determining the toxicity of the blood.

The results of Mairet and Bosc form an interesting commentary upon those obtained earlier by Doléris and Butte. Both succeeded in separating a definite toxic body from the blood; the latter obtained a crystalline principle from human blood in cases of eclampsia, the former obtained an albuminoid principle from healthy dog's blood. No one, so far as I can discover, has attempted to

* 'Comptes rendus de la Société de Biologie de Paris,' 1890.

† *Ibid.*, 1894.

control the observation of Doléris and Butte by repeating their experiments upon normal human blood. It therefore remains an open question whether normal human blood contains a toxic principle similar to that obtained by Mairet and Bosc from dog's blood.

After what has been said, only a brief reference need be made to the numerous experiments which have been published upon the toxicity of the blood in pregnancy and in eclampsia by the method of intravenous injection of blood-serum. Ludwig and Savor* in a series of twelve experiments with the blood-serum of healthy pregnant women, three only of which proved fatal, found the minimum lethal dose varied from 8·3 c.c. to 13·75 c.c. per kilogramme. In a series of forty-four experiments with the blood-serum of cases of eclampsia, death occurred in twenty-six, the lethal dose varying from 3·3 c.c. to 8 c.c. per kilogramme. No observations were made upon human blood-serum apart from pregnancy. Volhard† made a series of seventeen experiments by the same method with the blood-serum of healthy pregnant women; in thirteen instances death occurred, the lethal dose varying from 3 c.c. to 20·6 per kilogramme. In nine experiments with the blood-serum of cases of eclampsia death occurred in six instances, the lethal dose varying from 5·25 c.c. to 9·45 c.c. per kilogramme. Two rabbits, after receiving over 8 c.c. per kilogramme, remained unaffected.

While the results of Tarnier and Chambrelent, with those of Ludwig and Savor, appear to show that in eclampsia the toxicity of the blood-serum is increased, the results of Charrin and Volhard hardly support that view. Here the question must remain for the present. Physiological chemistry, if it should succeed in isolating definite toxic bodies from the blood, would, of course, do more to promote the solution of these problems than anything else.

An ingenious method of experiment employed by Van der Welde‡ deserves mention before leaving this part of the subject. Instead of attempting to prove that the urine of pregnancy is less toxic to rabbits than normal urine, he endeavoured to show that normal urine is more toxic to pregnant than to non-pregnant rabbits. He injected the urine of a healthy adult into the auricular veins of seven gravid and seven non-gravid rabbits, the same urine being employed for all the animals. As a result, he found that in the case of the gravid rabbits 9 c.c. per kilogramme caused convulsions, while in the case of the non-gravid 22 c.c. per kilogramme were required. He omits to state whether the non-gravid rabbits were bucks or does. From his

* *Loc. cit.* † *Loc. cit.*

‡ Congrès Internationale de Gynécologie et d'Obstétrique, 1896.

results he deduces the conclusion that the blood of pregnant rabbits is more toxic than that of non-pregnant rabbits; in other words, pregnancy in rabbits is attended with toxæmia. This conclusion certainly is not justified by his results. All that Van der Welde's experiments can be said to prove is that the resistance of pregnant rabbits to poisoning with human urine is less than that of the non-pregnant. This diminished resistance may or may not be due to a pre-existent toxæmia, but the experiments certainly do not prove it.

The attempts to establish by *direct* experimental proof the theory that there is a condition of toxæmia in normal pregnancy, and that in morbid conditions, such as eclampsia, this toxæmia is exaggerated, do not cover the whole field of experimentation to which Bouchard's work has given origin. *Indirect* proof of the toxæmic theory has been sought in another direction, which may now be briefly referred to. This is the attempt to prove by experiment that elimination by the kidneys is diminished during pregnancy, and especially so in such morbid conditions as eclampsia and albuminuria. If this contention could be established, it would be readily granted that an impure or toxæmic condition of the blood must result therefrom.

The method of experiment which has been chiefly employed is the hypodermic injection of some inert colouring matter, such as methylene blue or rosaniline; the test consists in determining the interval which elapses before the pigment appears in the urine, and the rate and regularity with which elimination proceeds and is completed. The *regularity* of elimination is believed to depend largely upon the hepatic functions, for Chauffard and Cavasse,* experimenting in cases of disorders of the liver, found the elimination rhythm was much disturbed. Writers frequently therefore speak of *renal* and *hepatic* elimination.

It is not necessary to follow in detail all the experimental work which has been published; a very careful review of the subject has recently been undertaken by Olivier,† who has also made a large series of personal observations, and to this work the reader is referred who desires to pursue the subject. Olivier's method was to inject into the buttocks 1 c.c. of a 10 per cent. solution of rosaniline trisulphate of soda or methylene blue; the urine was then collected at definite intervals, until elimination of the pigment was completed. In this manner observations were made by him upon six cases of normal

* 'Perméabilité chez les Hépatiques' (*Presse Médicale*, 1898, p. 129).

† 'Contribution a l'Étude des Auto-intoxications de la Grossesse au Moyen de la Méthode de l'Élimination provoquée,' Genève, 1901.

pregnancy, three cases of pregnancy with albuminuria, one case of normal labour, two cases of severe vomiting, and six cases of eclampsia. From his observations on cases of normal pregnancy, he concludes that elimination is deficient; from seven observations on cases of normal labour (six being cases reported by other writers), he concludes that elimination is distinctly diminished during the stages of dilatation and expulsion. The cases of albuminuria gave such contradictory results that Olivier was unable to formulate any conclusion from them; in a case which resulted in eclampsia, elimination was little altered; in others which progressed without complications there was marked irregularity in elimination. From the cases of pernicious vomiting, he concludes that this disorder may arise without evidence of either renal or hepatic insufficiency, or else that the method employed fails to detect such insufficiency. With regard to eclampsia, Olivier reports observations upon 28 cases (from all sources). In 12 of these cases no diminution in elimination could be determined; of these 6 were severe, 4 of them terminating fatally. Of the 16 remaining, in which the elimination was deficient, 12 were severe, with 3 deaths.

Olivier formulates some conclusions in closing his monograph, of which the following are the most important:

1. The methyl-blue test has yielded no information capable of being utilized clinically in diagnosis, prognosis, or treatment.

2. It proves that the most serious disorders may occur when the permeability of the eliminating organs is normal.

3. It shows that pregnancy may proceed to term without complications, even when an insufficiency of these organs has been indicated by the test.

4. Labour modifies the regularity of elimination, diminishing it during the stages of dilatation and expulsion, and increasing it after labour.

These conclusions do not prevent Olivier from expressing his conviction that a toxæmia of pregnancy exists, and that to this condition most of the disorders of pregnant women must be referred.

Having thus reviewed the considerable amount of work which has been undertaken with the object of establishing upon a basis of experimental proof the theory of the toxæmia of pregnancy and of the toxæmic origin of the disorders of pregnancy, the conclusion inevitably compels acceptance that proof of the theory has not been obtained, nor can it ever be obtained upon the lines of investigation hitherto adopted. Methods much more precise in their aims and careful in their execution are called for if this difficult subject is to

be elucidated by the fallacious method of experiment upon animals. The observations of Doléris and Butte, and Mairet and Bosc are full of promise, but, as already stated, unless physiological chemistry can separate definite toxic bodies from the blood, it seems impossible to devise experiments which will not be vitiated by serious sources of error.

The object of this paper is not to attempt to show that the toxæmic theory is unworthy of credence, but rather to show that the experimental evidence which has been adduced in its support is unsatisfactory. That normal pregnancy is accompanied by any condition of the blood which can rightly be called 'toxæmia' is doubtful in the extreme. That such disorders of pregnancy as eclampsia may be due to such a condition is, however, extremely probable, and although experiment has failed to prove it, clinical and post-mortem observations lend it a certain measure of sound support. In this connection the well-recognised liver changes, now regarded as characteristic post-mortem appearances in eclampsia, may be mentioned. Clinical points, however, open up a field too wide for summary or brief notice at the end of a paper.

REVIEW OF CURRENT LITERATURE

OBSTETRICS.

The Surgical Treatment of Uterine Myomata during Pregnancy and Labour (L. THUMIN: *Archiv für Gynäk.*, vol. lxiv., No. 3, 1901).—The writer begins by quoting Th. Landau's tabular expression of the symptomatology of fibroids. He points out that any or all of these symptoms may appear when myomata coexist with pregnancy, and that their intensity is usually increased by the complication. He considers at length, but without adding anything new to the discussion, the arguments in favour of and against the surgical treatment of myomata during pregnancy and labour. He then shows by a table that fifteen operations are logically possible upon a pregnant patient with a fibroid, but that practically these may be reduced to nine. He then proceeds to discuss the practically possible operations seriatim.

1. *Removal of the Tumour alone.*—Submucous polypi may be removed without reference to the stage to which pregnancy has advanced, but in enucleating fibroids of the cervix it is better to wait until the child is viable. The technique of this operation is simplified by the enlargement and softening of the parts due to pregnancy. Occasionally a pedunculated subserous fibroid may be removed during pregnancy by posterior colpotomy. The abdominal route must, as a rule, be chosen. Three illustrative cases are narrated, and two tables follow. One gives sixty-two cases of simple myomectomy during pregnancy performed since 1885, of which six were fatal. In another the operation was done during labour. But of the remaining fifty-five, abortion occurred in ten. The other table gives forty cases of enucleation of fibroids (all by the abdominal route) during pregnancy since 1885. Two patients died, and one was operated upon during labour. Of the remaining thirty-seven patients, eleven aborted. There are two cases (Mackenrodt and Van Hasselt) in which fibroids were enucleated by posterior colpotomy at the third month. Both patients recovered without abortion. The total gives 102 conservative operations with eight deaths, which shows an improvement upon the last list by Olshausen, which showed fifty-one cases with six deaths. The fœtal mortality (21 in 92) is low for cases complicated by fibroid tumours.

2. *Removal of the Ovum alone.*—The writer explains that the presence of a fibroid is not a good indication for the induction of abortion or of premature labour. At the end of pregnancy or during

labour conservative Cæsarean section may be performed under certain circumstances. Kirchheimer collected twenty cases (1881-93) in which eight mothers survived; the writer tabulates six cases (1895-98) in which three mothers and four children lived.

3. *Removal of the Ovaries alone.*—The writer considers that this operation is useless at any time, and contra-indicated during pregnancy.

4. *Removal of the Ovum and the Ovaries.*—When Cæsarean section has been performed, it may be found quite impossible to remove the tumour. It is then correct to remove the ovaries in order to sterilize the patient and to favour shrinking of the tumour. Three cases are reported (Tauffer, Hertzsch, and Hermann); two mothers and three children lived. The remote results are not given.

5. *Removal of the Ovum and the Tumour.*—This is in the highest sense a conservative operation, since with a living child the mother retains her sexual organs. Either Cæsarean section is done and followed by the removal of the tumour, or else, at the end of pregnancy, the tumour is removed and the delivery of the child is accomplished *per vias naturales*. A table follows, giving nine cases (1890-1901) of conservative Cæsarean section, with removal of fibroid. All the children lived, but one mother died on the third day of peritonitis.

6. *Removal of the Tumour and the Ovaries.*—The writer considers that occasion might arise in which it would be wise to sterilize the patient when removing a fibroid near the end of pregnancy or during labour.

7. *Removal of the Tumour, the Ovum, and the Ovaries.*—This may be done in addition to Cæsarean section with removal of the tumour, when it is advisable to sterilize the patient. It might be thought likely to prevent the development of small fibroids left behind in the uterus.

8, 9. *Removal of the Uterus, the Tumour, and the Ovum with or without the Ovaries.*—This, the radical operation, is discussed at length and in its varieties, according to the stage of pregnancy and the technique adopted. Six well-illustrated cases are narrated by way of example. Then follow four tables of collected cases. The first of these tables gives details of eighty-nine cases of supravaginal amputation of gravid fibroid uteri since 1885. There was a fatal result in ten cases, one of pneumonia, one of ileus, and the others of peritonitis or of sepsis.

The next table includes forty-nine cases of Cæsarean section followed by supravaginal amputation of the fibroid uterus since 1885. Six mothers and nine children were lost. Suicide followed a secondary laparotomy for ileus in one case. Ileus was responsible for a second death, and eclampsia for a third. One child was dead when born, a

second was asphyxiated, two were not viable, and two died soon after birth.

The third table deals with total extirpation of the fibroid uterus during pregnancy. Since 1893 fifty-six cases are mentioned, in fifty-two of which the abdominal route alone was used, the other four being combined abdomino-vaginal operations. There were five deaths, one from peritonitis following injury to the bladder. The other causes of death were ileus (thirty-ninth day), paralysis of the vagus, pulmonary embolism, and collapse in a weak and previously infected patient.

The fourth table includes fourteen cases of Cæsarean section followed by total extirpation of the fibroid uterus. These cases date from 1895, and one of them was done by the combined method. One mother died, and one of the children was dead before the operation. The others all survived.

In forty-five cases of supravaginal extirpation collected by Olshausen, there were eight deaths, and in nine cases of total extirpation there were three deaths. Backer later recorded twelve cases, with four deaths. Compared with these, the present writer's tables show great improvement, especially in the results of total extirpation, where the mortality has fallen from 33·3 per cent. to 8·92 per cent. The mortality in supravaginal extirpation is now 11·23 per cent. But examination of the causes of death shows that sepsis and peritonitis are much more rare in total than in supravaginal operations. Further, it must be noted that in many of the supravaginal cases the stump was treated by the extraperitoneal method, a great proportion of the deaths being amongst these. Apfelstedt reported three deaths out of fifteen Porro operations between 1886 and 1893. W. E. F.

Surgical Intervention in the Treatment of Fibroids obstructing Labour (ANDRÉ BOURSIER: *Annales de Gynéc. et d'Obstét.*, Nov. and Dec., 1901).—The writer points out that though a large number of cases of fibroids complicating pregnancy cause no trouble, yet a considerable number occur which either lead to interruption of the pregnancy or which necessitate surgical intervention. Abortion is specially liable to occur from hæmorrhage, owing to a morbid insertion of the placenta. Other morbid conditions met with are hydrorrhœa, œdema, constipation, retention of urine, cramps, neuralgias, ascites, nephritis, or eclampsia. Peritonitis, displacement of the uterus, thrombosis, embolism, may also occur, as well as grave conditions due to degeneration or gangrene of the tumour. Such complications may at any time necessitate surgical intervention. Boursier refers to the literature of the subject from the earliest times, and points out that the greatest dangers arise in labour from obstruction by tumours *in the pelvis*. Up to 1880 the mortality of Cæsarean section

in such cases was very high, but during the last ten years much better results have been obtained, and both maternal and infant mortality have been greatly reduced. The author points out that we now have before us the choice of Cæsarean section, Porro's operation, and total abdominal hysterectomy, of which the latter appears to be the most suitable.

Fibroids cause dystocia in the following ways: (*a*) The obstruction may be *fœtal* in origin (malpresentation, etc.); (*b*) the obstruction may be *uterine*, the fibroid disturbing the normal uterine contractions; (*c*) the obstruction may be due to the *fibroid itself*, and therefore mechanical. It is in the latter cases that surgical treatment is justifiable, and yields better results than obstetric intervention.

With regard to the frequency of *malpresentation*, with fibroids, Pujol finds that in 100 cases 53·82 per cent. presented by the head, 27·18 by the breech, and 19 per cent. were transverse. Malpresentation is caused by large subperitoneal fibroids which displace the uterus by their size, or by large interstitial fibroids; while submucous tumours may considerably distort the uterine cavity. With regard to dystocia of a *uterine* origin, fibroids interfere with the normal uterine action, leading to prolonged labour or inertia. This is especially the case with interstitial tumours, while fibroids of the cervix may cause true cervical rigidity. Dystocia due to the *tumour* itself is of a mechanical nature, and usually occurs with tumours of pelvic origin, situated either in the inferior segment of the uterus or in the cervix. Tumours occupying the posterior portion of the pelvic cavity are more liable to cause obstruction than those which are anterior. Large broad-ligament or retroperitoneal fibroids are particularly dangerous, while in some cases subperitoneal pedunculated fibroids may get fixed in Douglas's pouch and act in a similar way.

Boursier describes in detail the various pathological changes in fibroids occurring with pregnancy, as well as the degenerative changes which follow delivery. Of great importance in these cases is the diagnosis of the *amount* of obstruction, which may be either absolute or relative.

Dystocia due to fœtal or uterine causes may be terminated by such obstetric operations as manual dilatation, the use of hydrostatic dilators, forceps, or version. Basiotripsy or embryotomy may be applied when the child has ceased to live. In dystocia due almost entirely to the fibroid, if ordinary obstetric means fail, the writer maintains that surgical intervention (*i.e.*, abdominal section) is the proper proceeding, and should the obstruction be absolute abdominal section is certainly indicated, any vaginal interference being out of the question.

Perhaps one of the most debatable points is when to interfere.

One school—among whom are Pozzi, Labadie-Lagrave, and others—prefer to operate in the later months of pregnancy, but before labour comes on; the other—among whom are Pinard and Leguineau—would delay interference till labour has commenced, and when it is evident that ordinary delivery is impossible. If it be found that grave obstruction exist, Boursier maintains, with Pinard, that the best time for surgical interference is at the beginning of labour, or immediately after the rupture of the membranes, for then the child has a chance of life, and the risk of septic infection is less. If the obstruction seems absolute, and the diagnosis has been certainly made before labour comes on, probably the best course is to interfere before labour declares itself. In cases where the obstruction is only relative, obstetric means—forceps or version—may be employed; but if so employed, the danger of prolonged or repeated attempts to deliver in difficult cases must not be overlooked.

With regard to the choice of operative methods the author follows Pozzi in classifying such tumours into two great groups:

(1) Those that can be attacked by vaginal methods.
(2) Those for which abdominal section is necessary.

1. Fibroids that Obstruct Labour and can be treated by the Vaginal Method. — These include fibroids of the cervix, fibroid polypi, or fibroids that have been expelled into the vagina. Their removal is generally easy, either by division of the pedicle, or, if sessile, by incision of the capsule and enucleation. Spontaneous delivery frequently follows the extraction of the tumour, at other times forceps or version are necessary. Vaginal Cæsarean section as practised by Dührssen and Acconici is not recommended, the abdominal method being preferable.

2. Fibroids causing Obstruction to Labour and requiring Abdominal Section. — The following operations are discussed:

(*a*) Myomectomy.
(*b*) Symphysiotomy.
(*c*) Simple conservative Cæsarean section.
(*d*) Cæsarean section with partial removal of the uterus, including Porro's operation.
(*e*) Complete abdominal hysterectomy.

(*a*) *Myomectomy.*—This may be suitable for a few cases of subserous or pedunculated sub-peritoneal tumours. Turner reports seventy-seven cases treated by this method from 1874 to 1900. Probably the operation at full time, on a woman in labour, is both difficult and dangerous, especially with large tumours.

(*b*) *Symphysiotomy.*—This is certainly not an advisable operation

in dystocia due to fibroids. Varnier, Puech, Turner and most other obstetricians support this view. In fact, symphysiotomy is not a suitable operation for any tumour of the soft parts causing obstruction to labour.

(*c*) *Conservative Cæsarean Section* (*Hysterotomy*).—This operation in the present day certainly yields good results, the statistics of Leopold, Zweifel, and Olshausen giving a mortality of about 8 per cent. in uncomplicated cases, but when applied to cases of fibroids obstructing labour it is probably a hazardous undertaking, and at the same time it does nothing to remove the pathological condition. Added to this, the risks to the fibroid following delivery are great, and a subsequent pregnancy with all its dangers is still possible. This, of course, may be obviated by simultaneous removal of the ovaries or ligature of the Fallopian tubes. Cæsarean section, combined with myomectomy, may be an operation suitable for very exceptional cases.

(*d*) *Partial Removal of the Uterus* (*Porro's Operation*).—This, of course, has in many cases yielded most brilliant results, and even now may be a good operation under certain circumstances for fibroids obstructing labour. It is also a curative operation since tumours of the upper portion of the uterus are thus removed, and it admits of rapid performance even under unsuitable surroundings.

Partial removal of the uterus, with intra-peritoneal treatment of the stump is a distinct advance upon Porro's operation; the risks of sepsis are lessened or diminished, the operation is curative, and recovery should be as good and as rapid as with ovariotomy. Much of the success of this method depends on the ease with which the pedicle of the fibroid uterus can be secured and treated. Long operations, of course, increase the danger.

(*e*) *Total Abdominal Hysterectomy*.—This operation, according to Boursier, is the ideal one in cases of fibromatous uteri, though at present a sufficient number of cases have not been recorded. The risks from the pedicle are, of course, done away with, and no tissue is left from which fresh fibroids can grow. At the same time vaginal drainage can be used, or the peritoneum can be completely closed. As compared with supra-vaginal amputation, its performance takes much longer, and the difficulty of securing all the vessels, especially the vaginal branches, is sometimes great. The author, however, maintains that total abdominal hysterectomy for a fibroid uterus, an operation which is radical and curative, is a better operation than leaving the intra-peritoneal stump. C. H. R.

Treatment of Rupture of the Uterus.—H. VARNIER (*Annales de Gynéc. et d'Obstét.*, Oct., 1901) reports twenty-three cases of this condition. They are grouped in two classes, according to the treatment adopted—viz., (*a*) those treated *vaginally*, (*b*) those

treated *by abdominal section*. The first group of eleven cases occurred at the Maternité de Lariboisière and the Clinique Baudelocque, from September 1885 to September 1897; of these ten died. Between September 1897, and September 1901, Pinard, Varnier, or their pupils, Wallich and Puquy, have treated six other cases by abdominal section, of which three recovered (50 per cent.). Besides these, Varnier reports six other cases during the same period which died before the abdominal section could be performed, thus making a second series of twelve cases with three recoveries between 1897 and 1901, as against the first series of eleven cases with one recovery between 1885 and 1897. Varnier strongly inclines to the view that surgical treatment holds out better prospects than palliative treatment by the vagina. Of course cases occur where even this is impossible, even under the most favourable conditions, and he cites a case that died in fifteen minutes after the first symptoms of rupture; in most cases, however, there is plenty of time for laparotomy.

The author points out that the hard and fast lines laid down by many eclectics cannot be followed—viz., that (*a*) if the rupture be incomplete it should be treated by extraction of the fœtus by the vagina, followed by tamponnement; (*b*) if the rupture be complete and the fœtus escaped into the peritoneal cavity, abdominal section should be performed. Varnier maintains that even with the hand in the uterus it may be impossible to diagnose a rupture which is complete from one that is incomplete, or to determine the extent of the peritoneal lesion; and, further, that subperitoneal lesions, without the passage of the fœtus into the cavity of the peritoneum, give to the exploring hand the same sensation as complete rupture, and pathologically may lead to just as serious results. Not only does he insist on the necessity for *exploratory* operation in uterine rupture, but, further, that such operation should be *curative*. From the statistics of Cæsarean section quoted by Krakenberg, where the uterus was sutured and left *in situ*, and in which in a subsequent pregnancy the scar ruptured (even without the child leaving the uterine cavity), Varnier argues that if such scars yield, how much more will those following a uterine rupture! Therefore he advises that, having performed abdominal section for rupture of the uterus, the uterus should be removed.

The choice of operation depends upon rapidity of performance, especially if there be great shock. The operation advised by the writer in such cases is *subtotal* hysterectomy—that is, removal by horizontal section of that portion of the uterus already torn, and treating the remainder of the stump after the manner described by Porro. If the tears be very extensive Varnier advises Hartmann's modification, which is as follows: The muscular tissue of the torn

cervix is sewn up transversely, at the same time suturing up any peritoneal tears which may extend towards the side of the pelvis, so as to shut off entirely from the serous cavity the parts that are torn and bruised. Next the stump is fixed in the lower margin of the wound, its peritoneal surfaces being in contact with the abdominal wall on either side. The upper portion of the peritoneal cavity is then shut off by a strong catgut stitch, which unites the peritoneum on either side to the upper peritoneal surface of the stump. The bleeding and damaged surfaces are thus isolated from the main cavity of the peritoneum, and are drained by a tamponnement of gauze. The rest of the wound above the cervix is closed by two layers of sutures. The gauze is removed about the fourth or fifth day. In case of posterior rupture, drainage by the vagina is advisable. C. H. R.

Treatment of Uterine Inversion (Oui: *Annales de Gynéc. et d'Obstét.*, Oct., 1901).—The subject is considered under the following heads: (*A*) Treatment of recent inversion of puerperal origin; (*B*) treatment of chronic inversion of puerperal origin. Oui admits that the distinction between acute and chronic inversion is an arbitrary one, and proposes as a definitive point, the end of the puerperal state, or, in other words, the reappearance of the menstrual flow, all inversions persisting after this period being termed chronic.

(*A*) With regard to treatment of acute inversion of puerperal origin, Oui agrees with others that reduction should if possible be immediately resorted to, and the sooner the better. He refers to Hunt's statistics of sixty-seven cases, in which thirty-five were successfully reduced immediately after the accident, while in thirty-two cases reduction was not attempted till after forty-eight hours had elapsed, and in all cases failed.

With regard to immediate reposition of the uterus, the first point is, should the placenta, if adherent to the inverted uterus, be removed before attempting reposition? If the placenta be partially detached, there is no doubt that it should be removed; but should the placenta be adherent to the inverted fundus, the question of its removal before reduction is disputed. Pinard and others advise strongly that this should be done. On the other hand, Dührssen, Varnier, and others, advise that it should be left *in situ*, the latter authorities maintaining that the presence of the placenta does not add to the difficulties of reduction, that it protects the uterus from pressure during taxis, and prevents hæmorrhage in cases of inertia persisting after reposition. Oui does not think such arguments are of great value, since in published reports of cases no injurious pressure or persistence of inertia after reduction are described, and he concludes with Pinard and others that the placenta should be removed before attempting reduction.

Whether general anæsthesia is necessary for such reduction is a point worthy of consideration; probably if reposition is done immediately after the accident anæsthesia is unnecessary, but if several hours have elapsed an anæsthetic is of great advantage. Oui quotes a case where reduction was performed under hypnotic influence.

Methods of Operating.—Probably in acute inversion all instruments are dangerous, and manual taxis is preferable. Oui describes three such methods: (1) Central taxis, (2) peripheral taxis, (3) lateral taxis.

(1) *Central taxis* is the well-known method described first by McClintock of replacing the fundus with the closed fist till the uterus is reinverted, and maintaining it there till the organ is firmly contracted.

(2) *Peripheral taxis* was first described clearly by Anstruc. The right hand is introduced into the vagina as far as the inverted mass, and the fundus is reduced gently by pressure at the sides of the uterus till the whole inversion is replaced.

(3) *Lateral taxis* is the method of Deleurge. In this method, the inverted fundus having been grasped by the hand, the fingers pressing gently upon the posterior uterine wall, the thumb presses upon the anterior, and, owing to the sliding of the peritoneal surfaces upon one another, the portion of the uterine wall pressed upon by the thumb is gradually reinverted, little by little, till the reduction is complete.

Of these three methods the central is the one generally used, especially in recent cases. Great care should be taken to render the inverted fundus and exposed mucosa aseptic, or serious results may follow. An intra-uterine douche should be given after reduction. Oui rightly insists that every effort must be made to combat the severe shock which this condition gives rise to; intravenous saline injections, or subcutaneous injections of ether or caffeine, are of great value. Collapse may ensue even hours after.

(*B*) The next class of case considered is that where reduction of the inversion is necessary during the puerperal state. Atthill states that if the inversion has not been reduced within the first forty-eight hours after delivery, it is better to wait some weeks till involution is completed. Whether this hard and fast line should be adhered to, is doubtful. Taxis should be employed under anæsthesia, and may take a considerable time; Oui personally prefers the lateral method already described. All rigid repositors are attended with danger, as the uterus may be perforated. Continuous elastic pressure often succeeds where taxis alone fails, and such instruments as Aveling's repositor, Jariel's pessary, or Champetier de Ribes' bag, may be used. Another method is antiseptic tamponnement, which

plays the triple rôle of a disinfectant, a hæmostatic, and a compressor. Should such means fail, recourse may have to be made to laparotomy or anterior colpohysterotomy, though the latter operation is more suited for cases of chronic inversion. Failing these, the case may be left to the end of the puerperal period. With regard to cases already septic, or where the uterine mucosa is in a state of gangrene, Oui thinks that total vaginal hysterectomy is a better proceeding than to attempt reposition.

Pinard and Segond have described a modification of vaginal hysterectomy which may be termed the *extravaginal* method, removing the fundus and adnexa by cutting through the cervix at its junction with the isthmus. Abdominal hysterectomy for an infected inverted uterus, or after vain attempts have been made at reduction, is an operation of great danger, and is not advised. C. H. R.

Osteomalacic Pelvis.—In the *Centr. für Gynäk.*, No. 35, 1901, KEHRER, after briefly describing the *pelvis plana simplex*, *pelvis plana rachitica*, and *pelvis ubique minor plana*, adds that a fourth variety should be recognised, and to this type he gives the name '*pelvis plana osteomalacica*.'

The above term is applied by Kehrer to the first stage of the osteomalacic changes, which lasts for many years, even during repeated pregnancies, and can in after-life continue to exist *in statu quo*, or pass into the well-known tri-radiate form with beak-like deformity of the pubic bones. Pelves of this kind show a marked descent of the promontory, and a vertical shortening of the sacrum, whose lower vertebræ, as well as the coccyx, are placed more horizontally than normal. This change of direction in the lower sacral segment and the coccyx produces an angle projecting backwards which is peculiar to contracted pelves. The bending of the pubic bones and ischia, the crushing together of the ilia, and the omega form of the pubic arch are, however, wanting in this type of pelvis. Bimanually the anterior pelvic wall is felt as a shallow arch on its deep aspect, the pubic bones are of normal width, the inlet has the form of a well-marked kidney or bean, the angle at the outlet is subnormal, the promontory has sunk below a plane running horizontally through the symphysis pubis. Since in the first stage of bone-softening the pelvis is flat, but in the second stage it becomes contracted, the question of causation arises.

The descent of the promontory is caused by the trunk weight whilst sustaining the body in the vertical, as in standing and walking, or in the oblique whilst in the half-sitting posture. The dorso-median displacement of the acetabula does not result entirely from the upward-directed pressure of the femoral head against the socket of the joint, since pressure of the femora against decalcified pelves causes only an upward displacement of the acetabula. The median

force component occurs in part from elastic tension and temporary contraction of the hip muscles; the resultant of the two above-named forces runs obliquely upwards and inwards. We gather, then, that in osteomalacic pelves *the changes occur firstly in the dorsal wall, secondly in the anterior wall, and are followed by flattening and contraction.*

The influence of this form of pelvis on the mechanism of labour is next given in detail by Kehrer. It is the same as that of other flat forms of the first degree. Then follow details of two illustrative cases. In the first the patient was thirty-nine years of age, and had had eleven children. The first seven confinements were normal; during the eighth pregnancy the patient became tired on exertion; in the ninth and eleventh there was pain in the pelvis and legs; in the twelfth there was pain from the second month onwards, and the woman was feeble and decrepit. The ribs, sternum, and pelvic bones were painful to pressure. Walking was impossible after the third month. The pelvic measurements were: Interspinous 10·8 inches, intercristal 11·5 inches, diagonal conjugate 4·2 inches. Distance between ischial tuberosities, 2·9 inches. The birth of the child occurred ten and a half hours after labour began. The weight of the child was nearly 5 pounds, its length was nearly 19 inches. The puerperium was normal in every way. The second case was a woman aged forty-six. She had had fourteen children. The first thirteen pregnancies were normal. During the last three months of the fourteenth pregnancy there were thoracic and pelvic pains. In the fifteenth pregnancy pains were felt in the sides, shoulders, sacrum, and later in both femora. Walking gradually became difficult, and for the last six weeks the patient could only get about by the aid of a stick. On admission, the pelvic measurements were: Interspinous 11·2 inches, intercristal 11·6 inches, diagonal conjugate 3·6 inches. The anterior pelvic wall was smoothly arched, the symphysis was wide. Labour was induced in the thirty-second week, and a fortnight later, when discharged from hospital, the patient complained of bone-pains, and could not walk without support. The true conjugate measured 3·3 inches as taken a month after delivery. Castration was agreed upon. C. L.

Three Cases of Tubal Abortion complicated by Tubal Rupture.—The first two cases are recorded in the *Cent. für Gynäk.*, No. 43, 1901; the third was shown at the Obstetrical Society of London in December, 1901.

Case I. was recorded by SCHAUTA, who first saw the patient in 1898, after a period of amenorrhœa. She had passed a decidual membrane in January, 1898, with much hæmorrhage, and there was physical evidence of a right-sided tubal gestation, but she recovered within a week. In March, 1901, the patient again came under observation, having lost blood for three weeks after a period of

amenorrhœa, the duration of which is not given. A diffuse swelling was palpable on the left side, which was regarded as a gravid tube. The tumour became smaller, the bleeding less, and the pain vanished in seven days. In April the patient had what seemed to be a normal period, but on April 20 and 21 there was great pain and collapse, and the left-sided tumour was now the size of an apple, and on April 24 had increased to double this size. Laparotomy was performed on April 25. A hæmatocele was found on the left side, and in this the patent ostium abdominale of the left tube was embedded. The bent tube was seen, two fingers' breadth in width, lying over the hæmatocele, and in the thinned-out wall there was a rupture, from which blood was issuing at the time of operation. The right tube, which had become gravid in 1898, was now found to have its fimbriated end closed, and was involved in peritoneal adhesions. Schauta thought that the tubal abortion, with the resulting hæmatocele, took place at the time of the first attack of hæmorrhage and pain in March, and the rupture occurred on April 20 or 21 at the onset of the more intense collapse. That the defect in the left tube was not artificially produced was proved microscopically by finding that at this spot the villi had grown through the tubal wall.

Case II. was mentioned by CHROBAK in the discussion on the previous case shown by Schauta. The patient was a young primipara who had signs of internal hæmorrhage, from which she recovered. Six days later a fresh attack of pain and collapse necessitated laparotomy. A large hæmatocele was found on the right side, with the tube running over its upper wall and its ostium embedded in, and closed by, the clot. The tube showed a small rupture, from the edges of which a small artery was still spurting. The conclusion arrived at was that an abortion, resulting in the formation of the hæmatocele, had occurred at the time of the first attack of pain and syncope, and that the rupture accounted for the symptoms which developed six days later, and for which laparotomy was performed. The rupture was explained by the assumption that closure of the ostium by blood-clot, and then subsequent distension of the tube by continued hæmorrhage, caused a rupture at the weakest spot.

Case III. was recorded by AMAND ROUTH. The patient was aged twenty-seven, had been married three years, was delivered of a full-term child in 1899, had aborted at the eighth week in 1900, and suffered afterwards from endometritis.

The history immediately prior to the operation was that the September period lasted but two days, instead of five days, as was usual; and upon two subsequent occasions a spot of blood was seen, and since September 30, 1901, there had been pelvic discomfort. Upon examination on October 5, 1901, the uterus was found larger

than normal, and the cervix was soft, but nothing abnormal could be detected in the pelvis. On October 29 she had a severe attack of pelvic pain and faintness, and Routh found her collapsed from internal hæmorrhage. Upon opening the abdomen the left tube was found to be ruptured, and an artery was spurting from the margin of the tear, chorion and clot were adherent to the rupture in the tube, and the embryo was loose in the peritoneal cavity, which contained a quantity of fluid blood. The abdominal ostium was dilated and plugged by clot. The tube was removed by an incision through the mesosalpinx, the ovary being saved. The distal portion of the tube formed a thin-walled sac presenting three apertures, one the dilated abdominal ostium, the other two being ruptures of the anterior and posterior walls respectively. That on the anterior wall was rectangular, and appeared to have been caused during removal; that on the posterior wall was a rounded aperture with a villous tuft still adhering to its edge. The sac measured 6 centimetres by 4 centimetres; 1½ centimetres from the abdominal ostium was a septum partially dividing the cavity into two unequal portions, the constriction thus produced being too narrow to admit of the passage of the escaped chorionic mass, but being large enough to admit the fœtus. The sac walls were remarkably thin, and in parts appeared to consist of nothing more than peritoneum. The fœtus measured 2·5 centimetres in length. It seems evident that the first thing which happened was the discharge of the fœtus through the internal constriction, and then through the ostium abdominale. The chorion failed to pass the constriction, but by blocking it caused the tension from hæmorrhage to rise within the tube until the latter ruptured by hæmodynamic pressure, and thus a wider exit was afforded for the fœtal placenta. C. L.

GYNÆCOLOGY.

Cancer of the Uterus.—The improved results that have been obtained by Halsted's method of operation in the treatment of cancer of the breast is stimulating gynæcologists to the endeavour to find a safe operation that shall be attended by similarly improved results in cancer of the uterus. MACKENRODT (*Zeitsch. für Geburts. und Gynäk*, Bd. xlvi., No. 1, 1901) states that at the Giessen Congress it was shown that by vaginal hysterectomy a definite cure can be obtained in about 33 to 40 per cent. of operable cases, and in 10 to 12 per cent. of all patients seeking advice for carcinoma of the uterus. These results, as regards cancer, must be considered relatively favourable, but they do not appear satisfactory to many gynæcologists. A more radical operation must be based upon ascertained anatomical

and pathological facts. As regards the pathology of uterine cancer, it is important to note that the pelvic connective tissue is early implicated, and that often there is early infection of the pelvic glands. The paravaginal connective tissue can be almost completely removed through the vagina with the help in certain cases of a vagino-perineal incision, or of a paravaginal incision, as in Schuchardt's method. By the latter method Schuchardt has obtained, in a material showing 62 per cent. of operable cases, a definite cure in 24·5 per cent. Mackenrodt states that Schuchardt, in his operations, has paid no attention to the danger of infection of the fresh vaginal wound by cancer, and claims that he himself has obviated this danger by the use of the actual cautery in making the incisions. Igni-extirpation of the uterus through the vagina has given, in Mackenrodt's hands, 42·8 per cent. of lasting cures in a material showing an operable ratio of 92·9 per cent. The difference of 18 per cent. of radical cures between his figures and those of Schuchardt Mackenrodt ascribes to the avoidance of implantation metastasis in his method. Preparatory cauterization of the central portion of the mass does not suffice to prevent cancer infection of the operation wound, because there is an equal likelihood of infection by pieces derived from the peripheral portions of the growth.

Mackenrodt believes that the complete removal of the pelvic connective tissue through the vagina is a practical impossibility, but he further asserts that in all the cases that have been sufficiently investigated by him a complete operation was anatomically possible and recurrence avoidable. The removal of the whole of the glands, and not only of those that are already obviously diseased, is necessary. Mackenrodt thinks that there is a possibility of obtaining radical cures in more than 50 per cent. of cases of cancer of the uterus, and as in cancer there is everything to gain, and very little to lose by operating, the end to be aimed at is not good statistics, but the definite cure of as many patients as possible.

Influenced by the above considerations, and being assured that a complete removal of the pelvic glands is from their anatomical relations feasible, Mackenrodt has sought for a suitable operative method. He found that the removal of the glands was not possible through a median lower abdominal incision, and the method he has arrived at after careful trial is a subperitoneal one carried out through a horseshoe-shaped incision. The cancerous growth is prepared two days beforehand by curetting and packing with gauze soaked in 10 per cent. formalin solution. The operation is briefly as follows: A vertical incision is made on each side along the lower part of the outer border of the rectus muscle. The lower ends of these incisions are joined by a transverse cut just above the pubes. The attachments of the recti to the pubes are divided. The peritoneum is pushed off

unopened from the large abdominal flap, and is cut across above the bladder. The uterus is then drawn up through the opening, and its peritoneal attachment divided all round. The peritoneum separated from the anterior abdominal wall is next sutured to the peritoneum on the posterior pelvic wall from one side to the other. The peritoneal cavity is thus shut off above, while below the pelvis, with its contents, lies widely open. The peritoneum is now pushed off the lateral pelvic wall, and the glands are removed retroperitoneally as high as the bifurcation of the aorta. Finally, the uterus, and as much of the vagina as seems desirable, are removed. If the ureters are implicated in the growth, it is claimed that portions of them can be easily removed, and the ends implanted in the bladder. As regards the treatment of the wound left after removal of the uterus, in the first five patients operated upon in this way the whole enormous cavity was stuffed with iodoform gauze, and the parietal wound closed by sutures. Four out of the five cases died from septic infection that undoubtedly arose from the vagina and the injured rectum. In several further cases the wound was divided into four, the bladder being first sutured to the stump of the sacro-uterine ligaments, and the lower compartment of the wound thus formed being drained into the vagina. The upper compartment was then divided into three by suturing a fold of peritoneum to each lateral border of the abdominal flap, and these three cavities were separately drained through the abdominal incision by tubes with gauze. After this method of treatment of the wound, healing proceeded smoothly in six cases. One avoidable death took place, being caused by hæmorrhage from a cut epigastric artery.

Mackenrodt thinks that, with the above operation, not only can a larger percentage than usual of radical cures be obtained, but the indications for operation can be greatly extended. T. W.

Cancer of the Uterus.—H. W. FREUND (*Zeitsch. für Geburts. und Gynäk.*, Bd. xlvi., No. 2, 1901) says that, although by vaginal hysterectomy 15 to 20 per cent. of permanent cures can be obtained in cancer of the uterus, there is no guarantee of cure in any individual case, because the neighbouring tissues, and even in early cases the glands, may be already affected. In fifteen cases of abdominal hysterectomy for cancer now related by him the glands were infected and were removed in four. The author thinks it possible, however, that in others the glands may have been infected, because Rosthorn, by careful microscopic examination, has frequently found cancerous infiltration in glands that presented no suspicious naked-eye appearance; this is an important point that calls for further investigation. Freund's fifteen cases, removed by laparotomy, include three cases where the disease was limited to the uterus. The longest period of freedom from recurrence in any of the three was one year and five

months, so that these cases call for no further note. In twelve other patients laparotomy was carried out in cases where the carcinoma had already spread beyond the uterus; in two of these the bladder, and in three one or both ureters, were injured. Two of the twelve died as the result of the operation; one patient was well a year and a quarter, and another nine months, after operation; while a fifth was still living four months afterwards, having in the meantime had one kidney removed for a ureteral fistula; in a sixth case the operation was incomplete. The remaining six cases out of the twelve recovered from the operation, but all of them died within a year. The results of abdominal hysterectomy in advanced cases appear thus to have been highly discouraging.

Freund concludes that the abdominal operation should be limited to cases where the disease is still confined to the uterus or its immediate neighbourhood, and finally emphasizes the fundamental importance of early diagnosis. T. W.

The Prognosis of Operations for Uterine Cancer in Pregnancy, Labour, and the Puerperium, and at the Climacteric.—KONRAD HENSE (*Zeitsch. für Geburts. und Gynäk.*, Bd. xlvi., No. 1, 1901) seeks to find a statistical basis for the opinion that the prognosis of cancer of the uterus is widely different according as the disease occurs in connection with pregnancy, labour, and the puerperium, or after the menopause. He has collected particulars of 122 cases in which radical operations were performed during pregnancy and the puerperium, and, taking the period of freedom from recurrence for five years or upwards as evidence of radical cure, 41 out of the 122 cases are of long enough duration and sufficiently observed for statistical purposes. Of these 41, 31 died of recurrence, and 10, equal to 24 per cent., remained well after five years. This rate is notably inferior to the rate of 30 per cent. of permanent cures found by Winter and Fränckel in 230 cases operated upon in the Frauenklinik at Berlin. The percentage of cures thus shown in pregnant and puerperal cases lends support to the rule of practice that holds in Germany—to attempt, without reference to the fœtus, a radical cure in cases that admit of operation. This rule of practice is diametrically opposite to that which obtains in France, where, at a discussion held in February last at the Society of Obstetrics, Gynæcology, and Pædiatrics, the speakers generally agreed that, as the mother, in spite of extensive operations, always died in a short time, the fœtus only should be considered; the mother, in fact, should be abandoned to her fate in favour of the infant.

The rapid growth of cancer during pregnancy can be explained by the increase in number and size of the lymph and bloodvessels. Zweifel observed the rapid growth of a carcinoma in pregnancy by marking with a suture the limit between sound and carcinomatous

tissue. In fourteen days the new growth was found to have extended by the breadth of two fingers.

In marked contrast to the state of the tissues in pregnancy and the puerperium are the conditions that are found after the menopause. At this time atrophy of the generative organs takes place, with diminution of the size and number of their lymph and blood vessels, and consequent closeness of texture and relative dryness of the tissues. The danger of rapid spread along the lymphatics may thus be expected to be considerably less, and operations for carcinoma at this time ought to give a far better prognosis. This favourable outlook Hense tries to establish in figures. In the Berlin clinic, between the years 1886 and 1892, 73 climacteric cases of cancer of the uterus occurred. Leaving out 13 deaths, and 5 cases observed for less than five years, 55 cases are left for consideration. Of these, 24 recurred, and 31, equal to 56·34 per cent., remained well. Among the 55 were 43 cervical and 12 corporeal cancers; of the latter, 8, equal to 66 per cent., remained free from recurrence. The 56·34 per cent. of permanent cures may fairly be compared with the 33 per cent. rate in all cases quoted above from Winter and Fränckel, because both sets of figures are derived from the experience of the same clinic and for the same years—viz., up to 1892. In the Königsberg clinic for the years 1887 to 1899, 41 cases of climacteric cancer occurred, but of these only 18 were available for statistical purposes. Of the 18, 12 recurred, and 6, equal to 33 per cent., remained free from recurrence for five years and upwards. Among the 18, 7 were cancers of the body, of which 4 recurred and 3 remained sound. All the cases, both at Berlin and at Königsberg, were operated on by vaginal hysterectomy. Putting the two sets of cases together, it appears that, in 73 cases of operation for climacteric cancer of which a sufficient history has been obtained, there were 37 permanent cures, equal to fully 50 per cent. It is thus proved that the climacteric exerts an adverse influence on the growth of cancer, and, on the contrary, is favourable to the permanent success of operations for the radical cure of the disease. The age at which the menopause comes on does not matter; the factor of importance is that the menses have ceased and atrophy has set in.

To sum up, pregnancy, parturition, and the puerperium give the worst, and the climacteric the best, prognosis for the radical cure of operable cases of cancer. T. W.

The Early Diagnosis of Uterine Cancer (ABEL: *Archiv für Gynäk.*, vol. lxiv., No. 2, 1901). — The writer contrasts the statements of various authors regarding the microscopic diagnosis of carcinoma uteri, and concludes that a further criterion is wanting between benign and malignant epithelial new growths. This he considers is to be found in a consideration of the relations of both

to elastic fibrous tissue. With new staining methods, increased attention has been paid during the last few years to the elastic fibres. Staining with resorcin-fuchsin is recommended as a convenient and helpful method for their study. Meissner says that in cancer of the skin a new element, the growing ectodermal portion of the skin, invades the corium, the elastic fibres being displaced or destroyed. The writer figures cancer of the portio vaginalis as seen under a low power. The elastic fibres appear sharply defined at the margins of the masses of epithelial new growth. But, more highly magnified, he figures the same portion of tissue showing a quantity of elastic fibres within the epithelial masses. They partly surround the groups of cells of which the large alveoli are made up, and short broken fibres are seen between the cancer cells. This implies, says the writer, that carcinoma does not merely mechanically displace elastic fibres, but also destroys them. The appearance of the remains of elastic fibres between the cells of an epithelial growth constitutes for him a proof that the growth is malignant. Elastic fibres are not found between the cells in a mere hyperplasia or a benign overgrowth of the epithelium, any more than they are seen between the epithelial cells of the healthy epidermis. It need hardly be said that this criterion applies only in growths derived from stratified epithelium. W. E. F.

Tuberculosis of the Portio Vaginalis and Cervix Uteri: its Pathology, Diagnosis, and Treatment (HENRY D. BEYEA, M.D.: *Amer. Jour. of the Med. Sciences*, vol. cxxii., No. 6, Nov., 1901). —The author points out that although tuberculosis of the Fallopian tubes, ovaries, and vagina is frequently in evidence, and its pathology and clinical significance as well appreciated as that of tuberculosis in any other part of the body, tuberculosis of the portio vaginalis and cervix uteri is of very rare occurrence, and has not met with the same degree of consideration. His studies were instigated in this direction by an example that came under his care in the University Hospital of Pennsylvania, and he collected from literature 69 additional cases: 30 discovered post-mortem associated with advanced tubercular lesions in other parts of the genital tract and distant parts of the body; 2 post-mortem discoveries of primary tuberculosis of the cervix; 22 clinical observations alone (of these three were associated with lesions in other parts of the genital tract and distant parts of the body, four with lesions in distant parts of the body alone, six with lesions in other parts of the genital tract alone, and nine where the disease was limited to the cervix or no statement was made as to whether other parts were affected); and 15 cases were observed both clinically and post-mortem, all of which were associated with tuberculosis in other parts of the body.

Age of patients was recorded in 58 cases:

17 to 20 years	...	...	...	...	6 cases.
21 „ 30 „	...	...	...	...	27 „
31 „ 40 „	...	...	...	...	9 „
41 „ 50 „	...	...	...	...	5 „
51 „ 60 „	...	...	...	...	5 „
61 „ 70 „	...	...	...	...	3 „
71 „ 79 „	...	...	...	...	3 „

showing that the disease is most frequent during the period of sexual activity.

In 19 cases disease was limited to the portio vaginalis.
„ 6 „ „ „ „ cervical canal.
„ 44 „ both were infected.

The clinical characters can be distinctly divided into three varieties:

1. *Tubercular Ulceration.*—Single large, or multiple minute ulcers, either distributed over the portio vaginalis or cervical canal, or completely excavating the canal and destroying the portio vaginalis. The ulcers were excavated, yellowish-white, and had sharp edges. The cervix was often hypertrophied. In the early cases the tubercular change was localized to the mucous membrane.

2. *Tubercular Papillary Hyperplastic Endocervicitis.*—This involves the cervical endometrium, especially the lower half, extending into the vaginal portion like an erosion. The growth is composed of small, finger-like processes, rose-red in colour, with rarely slight indications of caseation.

3. *Miliary Tuberculosis of the Cervix.*—Two cases have been reported, minute miliary tubercles being scattered over the vaginal portion, associated with extensive and advanced tuberculosis in other parts of the body.

The large majority of cases of tuberculosis of the cervix have been secondary infections, only three cases having been positively stated as primary.

Symptomatology.—No characteristic symptoms have been noted: the most frequent has been an abnormally profuse purulent leucorrhœa, now and then tinged with blood.

Diagnosis.—The papillary form at first sight resembles the cauliflower epithelioma of the cervix, but does not bleed so easily or early to touch, and the tissue is not easily broken or friable, but has an elastic, velvety feel. The ulcerative form may be taken for the excavating carcinoma of the cervix; but here, too, the tissue has an elastic feel, friability is absent, and the induration differs distinctly. The history, age, and duration of the disease are important factors. The ulcerative form also resembles syphilitic chancre.

TREATMENT.—As a rule, operation. If the lesions of the genitals are the cause of the patient's illness, panhysterectomy. If the lesions are the chief cause, and there is latent tuberculosis in other parts of the body which is not likely to be lighted up by operative measures, panhysterectomy. If there are extensive tubercular lesions in other parts of the body, cauterization of the cervix.

In the cases of panhysterectomy, 7 completely recovered, 3 died of shock following operation, 1 of phthisis, and 1 of tubercular peritonitis. Of the cases of local treatment, 5 temporarily improved, and in 5 the disease progressed. C. B.

Cancer of the Fallopian Tube and Salpingitis.—LE COUNT, of Rush College, Chicago (*Bulletin of the Johns Hopkins Hospital*, March, 1901), has prepared a very solid essay, entitled 'The Genesis of Carcinoma of the Fallopian Tube in Hyperplastic Salpingitis, with Report of a Case and a Table of Twenty-one Reported Cases.' He, like most of his predecessors, has prepared a table of recorded cases. It includes twenty-one examples of carcinoma, which were selected from fifty-two cases that had been reported as papilloma or carcinoma. He excludes fifteen out of the fifty-two on account of insufficient data, and remarks that, of the remaining thirty-seven, some have been shown to be instances of mere hyperplasia of the tubal mucosa due to inflammation. This hyperplasia is usually combined with dilatation of the closed tube, and leads to the formation of benign localized growths of uncertain rank in the domain of tumours, or to more diffuse growths that may possess some of the characteristics of malignancy; this class is likened by Le Count to the carcinomata that develop in scars, burns, or fistulæ from long-continued irritation. The table is in some respects not so satisfactory as several already published by other authorities; the cases are not numbered, and neither the age of the patient, number of children, nor symptoms before operation, are included, though, of course, there is a column for the essential factor—recurrence or death from operation. Le Count reports a new case with extreme precision, and his description of the pathological appearances is based not only on careful research, but also on personal knowledge of the latest views of general pathologists on cancer—knowledge which very few gynæcologists can possess. The patient was forty-seven. In early married life she had two miscarriages. When twenty-six she gave birth to a child at term; the labour was severe and instruments were used. Then she had several miscarriages, all at or under the fourth month. Yet her health was good till two years before the present illness, when dysmenorrhœa set in; it began just before the show, and continued till the end of the period. A protrusion appeared at the vulva, and was taken for a prolapse. The abdomen became as large as in pregnancy at term. There was constant

vaginal discharge, often streaked with blood. Henry P. Newman, of Chicago, operated. Over 2 gallons of ascitic fluid escaped on opening the peritoneal cavity. The left tube was very much enlarged and thickened; the ovary was not involved. The tube alone was therefore excised close to the uterus. The right appendages were normal. Douglas's pouch, which protruded downwards abnormally, was opened from below, and a large amount of ascitic fluid escaped; the corresponding part of the vagina which protruded at the vulva was lastly excised. Ascites set in within ten weeks of the operation, and paracentesis was performed several times. Six months after the first operation, Dr. Byron Robinson, of Chicago, opened the abdomen. The peritoneum was studded with papillomatous growths; some big masses were removed. The mesentery and omentum were infected. The patient recovered from the second operation, which was performed in December, 1899. Paracentesis was necessary five months after the second operation, and was repeated every two or three weeks. The patient was alive and fairly well over one year after Dr. Byron Robinson operated. The left tube, removed by Dr. H. P. Newman, measured over 4 inches in length, and was very much enlarged; as usual in such cases, it was somewhat tortuous. From the abdominal ostium issued an exuberant cauliflower mass. Much of the cancer in the walls of the tube was necrotic. The microscopical appearances are described at great length. It is noteworthy that this was a case of cancer of the tube, with patulous ostium, the rule being that the ostium is closed. As it was open, the morbid contents of the tube escaped into the peritoneal cavity, and caused ascitic effusion. Le Count notices how in the classical case, as he terms it, described by Doran the tube was filled with cauliflower growths, and the ostium remained open. Ascites and hydrothorax developed in consequence; but the patient was living, free from recurrence, sixteen years after the tube was removed. Le Count believes that Doran was more correct when he likened the cauliflower growth to venereal condylomata, and to Rokitansky's inflammatory polypi of the tubal mucosa, than when he chose to term the growth a 'papilloma'—that is to say, a neoplasm from the first, not an inflammatory product from the first to the last. Le Count demonstrates the imperceptible transition of hyperplastic processes of the tubal mucosa, essentially salpingitic, into true tumour growth, resulting in the production of benign tumours. Where such genuine neoplasms can develop, worse may occur or follow—that is to say, malignancy. Le Count insists that primary cancer of the tube should be described as adeno-carcinoma, comparing its development with that of adeno-carcinoma as described by Cullen. Doran, Macrez, Danel of Lille, and others, have already shown how cancer seemed traceable through 'papilloma' (as they preferred to call it) to purely inflammatory

disease of the tube. Le Count seems to have established that theory on a firm basis of pathological evidence. As has been said before, an old inflamed, dilated tube is a source of danger. A. D.

Another Case of Primary Cancer of the Tube.—HURDON (*Bulletin of the Johns Hopkins Hospital*, Oct., 1901) has brought forward a note of yet another case, which was almost in type when the above-reported case of Le Count's appeared in print. The patient was a woman, aged sixty-three, admitted into a private sanatorium under Dr. Howard Kelly. She had passed through four normal labours, and had enjoyed perfect health until an attack of typhoid fever, nearly a year before admission. After convalescence she was troubled with an almost constant sanious vaginal discharge, one of the most frequent clinical symptoms of primary cancer of the tube; there was also frequent rise of temperature. A swelling as big as a small orange was detected on the left side of the uterus. Pyosalpinx was, very naturally, diagnosed. At the operation (March, 1898) the uterus, the diseased parts and the right tube were removed, but the right ovary, being normal, was not touched. The diseased structures adhered firmly to the sigmoid flexure of the colon, which was slightly damaged during separation, but its mucous membrane was not involved in the laceration, which was easily repaired. There were no complications during convalescence. For more than a year after the operation the patient enjoyed excellent health, then hypogastric pain, apparently but slight, set in, and twenty-five months (April, 1900) after the first operation the abdomen was opened once more. A small oval mass of about the size of an olive was dissected out of the base of the left broad ligament, and a nodule as big as a small bean was removed from the posterior surface of the bladder. The patient appeared to be in good health when Dr. Hurdon's report was written, one year after the second operation. The uterus and right tube, removed in 1898, were free from cancer. The left tube presented the appearances usually observed in primary cancer. It was greatly dilated and contorted, as in hydrosalpinx, and was about $5\frac{1}{2}$ inches long. Papillary masses sprang from the mucous membrane along the lower part and the whole of the outer third of the diseased tube; they were finely branched, and had coalesced to a great extent, forming a more or less homogeneous mass. On microscopic examination there was no evidence of old inflammation. The papillary masses sprang directly from the inner surface of the tube wall, corresponding to the folds of the mucosa, and at one or two points normal folds could be traced into the tumour substance which had invaded the muscular coat of the tube at other points, where it assumed the form of solid epithelial nests or small gland-like structures. The ovary was slightly enlarged and bore some small cysts; these at a point where

the ovary came into contact with the tube were invaded by the cancerous growth. The nodules removed at the second operation proved, on histological examination, to have the same structure as the primary growth. It is becoming clear that primary cancer of the tube is by no means a very great rarity, and still less an impossibility, as was till very recently believed. A. D.

The Development of Follicle Germs in New Growths: a Contribution on the Origin of Ovarian Tumours (H. SCHRÖDER: *Archiv für Gynäk.*, vol. lxiv., No. 2, 1901).—The writer remarks that, though recent text-books seem to describe every variety of ovarian tumour which is logically possible, certain instances occur which do not fit into any scheme of classification. He proceeds to describe such a case: The patient was thirty-six years of age. Her family and personal history are without interest to the reader, as are the results of physical examination, with the exception of the fact that she had a firm tumour, the size of a billiard-ball, in the position of the right ovary. The uterus and the left ovary and tube were removed by the vaginal route, together with the right tube and the tumour. Microscopic examination showed the tumour to consist of alveoli which varied greatly in size, and which were completely filled with epithelial cells, embedded in a stroma of firm connective tissue. Each alveolus was lined by a layer of columnar epithelium—a basal epithelium—and within the alveoli, surrounded by radially arranged epithelial cells, were little discs of protoplasmic material. The larger alveoli contained numbers of these 'encysted follicle-like structures,' and nuclei were seen within some of the protoplasmic masses. Sections of the left ovary, which to the naked eye appeared perfectly healthy, showed, on microscopic examination, appearances which proved that the alveoli of the tumour of the right ovary were developed from Graafian follicles; for amongst the cells of the theca folliculi (membrana granulosa) of the follicles in the left ovary, little discs of protoplasm, surrounded by radially placed epithelial cells, occurred, which were identical with the little structures observed in the alveoli of the tumour of the right ovary.

The writer next describes similar cases which have been recorded by von Kahlden, Mengershausen, and Emanuel. He remarks that, had the small structures resembling primordial follicles been absent, his specimen would have been simply called an 'alveolar carcinoma of the ovary.' The presence of these structures, however, demands an explanation of their origin and their meaning. They are not the result of degeneration, though they resemble in some degree structures which have been described as 'epithelial vacuoles,' and which are next discussed at great length, with the conclusion that various authors have applied this name to different appearances, and that it is unsuitable for the structures observed by the writer (Von Franqué,

Bollenhagen, Rabl, and Wendeler). These are not the result of passive, but rather of active, changes in epithelial cells. The cells of the follicle epithelium are, in a sense, potential ova, and under certain pathological circumstances they form structures suggesting primordial follicles, which thereafter are capable of development into malignant neoplasms. The writer therefore holds that the new growth in question is derived from follicles and egg-cells. The alveoli have the structure of follicles, with tunica externa, tunica interna, basal membrane without structure, a layer of basal epithelium, and follicle epithelium within. The small encysted follicles within closely simulate true ripening follicles; the only heteroplasia occurs in the formation of the central disc of protoplasm. This is an imperfect attempt at the formation of an egg-cell. Gottschalk has described a growth which he named 'folliculoma malignum ovarii.' The writer adopts this name for his own case. The 'adeno-carcinoma folliculare ovarii' of Mengershausen, the 'adenoma folliculi Graafiani' of von Kahlden, and the 'folliculoma malignum ovarii' of Gottschalk, together with his own, the writer considers to form a group of new growths, arising from the same structures, sharing the general name 'folliculoma,' and forming a new class of ovarian tumours. It will be time enough to subdivide this class when more examples are forthcoming. W. E. F.

The Treatment of Chronic Pelvic Exudations (*Cent. für Gynäk.*, No. 52, 1901).—In a lengthy paper KEHRER describes the various methods of treatment employed on the Continent at the present time in cases of para- and perimetritis, fixed retroversion and subinvolution of the uterus. Whilst for local exudations the treatment is for the greater part conservative, the fact that 95 per cent. of all cases of parametritis end in resolution prompts one to employ as a method of treatment such means as are calculated to aid absorption of inflammatory exudates. Alteration in the pelvic blood-flow in the direction either of hyperæmia or anæmia can be brought about by medicinal, hydrotherapeutic, mechanical, and thermal means.

Hydrotherapy is largely employed with the idea that it accelerates tissue change and favours absorption of inflammatory products. At least 24 pints of *hot* (temperature not stated) water is used to irrigate the vagina many times daily. Continuous irrigation whilst in a warm sitz bath is also employed. On removal from the bath the patient is put to bed, and moist warmth is applied to the abdomen by fomentations or by the thermophore. Freund, Pincus, Halban, and others, employ pressure-therapy, Halban using a quick-silver colpeurynter, Pincus a colpeurynter containing mercury and air. Pressure gives best results with large exudations, in which the mass can be compressed by sand-bags placed upon the abdomen,

used in conjunction with a mercurial colpeurynter below. Pressure-therapy should be employed alternately with hydrotherapy.

Kehrer has devised a hot-air apparatus for the treatment of patients suffering from pelvic inflammations. It is a simple structure not unlike an ordinary semicircular bed-cradle, from the bars of which hang two wooden shelves, one on either side, each bearing two electric lamps. The apparatus is covered with asbestos, and when in position spans as an arch across the patient's abdomen. With all lamps burning a thermometer on the exposed skin registers 212° F., and the patient's axillary temperature rises from four to six tenths of a degree. By interposing a thin linen garment between the bared abdominal wall and the electric rays, the burning and prickly heat complained of disappear. Universal sweating soon takes place, and becomes profuse; nevertheless, the body-weight increases under this treatment. After thirteen daily applications one woman's weight increased from 101 pounds to 111 pounds.

As an example of what can be done by the hot-air treatment, the following case is recorded: A patient, aged twenty-seven, was admitted with the history of miscarriage at the seventh month having occurred two months previously. On admission (October 7, 1900) there was found a stony hard swelling in the left broad ligament, spreading in a fan-shaped manner to the pelvic wall, to which it was adherent. The left adnexa were not palpable. The swelling extended behind the cervix, around the rectum, and across to the opposite side, so that the enlarged uterus lay embedded in the mass. From October 7 to 19 ichthyol-glycerine tampons, sitz baths, continuous irrigation, and mercurial pressure, were employed without any apparent reduction in size of the exudate. From October 19 to 31 hot-air-therapy was adopted. On November 1 the patient, for private reasons, had to leave the hospital; the uterus was then movable, but retroposed and obtusely anteflexed. The sacro-uterine ligaments were of the thickness of a blacklead pencil, shortened, painless, and extensible; in the left broad ligament was a swelling flattened from before backwards, the size of a chestnut. C. L.

The Removal of Pelvic Inflammatory Masses by the Abdomen after Bisection of the Uterus (Howard A. Kelly: *Bulletin of the Johns Hopkins Hospital*, vol. xii., No. 118, 1901).—The author calls attention to the great value which may accrue from the bisection of the uterus in certain cases of pelvic inflammatory disease, when by any other method it is practically impossible to deal adequately with the condition, and he takes as an example pelvic abscesses on both sides, densely adherent to all the surrounding structures, including the uterus, which is itself buried in a mass of adhesions. He operates as follows: The bladder and rectum are separated, and the fundus uteri found. Any abscesses or adherent cysts are then

aspirated, and the rest of the abdominal cavity packed off. The uterus is lifted up by a pair of forceps attached to each cornu, and is then incised in the median line in an antero-posterior direction, and as the uterus is bisected its cornua are pulled upwards and apart; then, by grasping the cut surfaces with forceps, the halves are everted and the bisection carried down into the cervix or into the vagina if pan hysterectomy is to be performed. The uterine canal must be followed in the bisection. The cervix is then divided on one side, the under surface of the uterine end pulled up, and the uterine vessels tied; then, as the uterus is pulled still further up, the round ligament is clamped, and, finally, a clamp is applied between the cornu of the bisected uterus and the tubo-ovarian mass, and one-half of the uterus is removed. The opposite half is taken away in the same manner, and the tubo-ovarian masses can then be deliberately dissected away, as there is abundant room for investigation of their attachments. The author claims the following advantages:

1. Additional space for handling adherent adnexæ, afforded by the removal of the uterus.

2. Great increase in facility for dealing with intestinal complications.

3. Better access by new avenues from below and in front to adherent lateral structures.

4. Elevation of structures to or above pelvic brim, bringing them within easy reach of manipulation and dissection.

In general, the time of the operation is shortened, its steps are conducted with greater precision, surrounding structures are less liable to be injured, so that there are fewer after troubles, and the mortality is lowered. The author does not recommend the operation to a beginner in surgery, and states that the most critical point is the bisecting of the cervix and controlling the uterine vessels. If the vessels are cut at the same time as the cervix, frightful hæmorrhage results, and the ureter may easily be injured by indiscriminate clamping of the uterine vessels. C. B.

Retro-uterine Hæmatocele unconnected with Extra-uterine Gestation (*Cent. für Gynäk.*, No. 39, 1901).—KOBER, after stating that some gynæcologists go so far as to regard ectopic fœtation as the sole cause of such blood extravasations, proceeds to mention four cases as occurring in the practice of H. W. Freund in which extra-uterine pregnancy was capable of being excluded as the etiological factor. He then describes two cases in detail taken from the clinic of Pfannenstiel.

CASE I.—The patient was aged twenty-eight, married for six and a half years, and had had five normal pregnancies. The last period —from February 10 to 17—was normal. Painful coitus took place on March 9, followed by abdominal disturbance, dragging pains, sickness, and continuous profuse hæmorrhage. On examination, the

temperature was 81·7° F.; pulse 86. The uterus was somewhat bulky and anteflexed. Nothing abnormal was discovered in the adnexa. There was a solid mass in Douglas's pouch, the upper limits of which were not defined. The urine was free from albumin and sugar. The diagnosis of hæmatocele, probably following extra-uterine gestation, was made, and at the operation on March 15 the pouch of Douglas was found to be filled with blood-clot, which was easily removed. The adnexa of both sides were now drawn forwards, and *the tubes and ovaries were found absolutely normal; there was no tubal dilatation visible;* the fimbriated ends were normal, and the other abdominal organs, together with the peritoneum, showed no pathological process to account for the bleeding.

Case II.—The patient's age was thirty-seven. There was a history of one normal pregnancy and one abortion, neither being followed by any complications. The periods were always regular. The last period occurred at the end of November, 1900. On December 24 the patient undertook heavy manual labour, and upon going to bed sudden violent pain and some slight hæmorrhage occurred. There was no improvement on the following day. On admission the temperature was 98·2° F., the pulse was 72 to 80, the lungs and heart were normal, the breasts contained colostrum. The uterus was lying immediately posterior to the symphysis. Behind the uterus a mass larger than a man's fist was felt. The diagnosis was hæmatocele, extra-uterine gestation being the probable cause. The operation was performed on January 9, and a hæmatocele extending above the left ilio-pectineal line was found. The left tube was now freed and removed. A tumour on the right side, the size of a hen's egg, was next found, and in freeing this it burst. The right tube and ovary, which entered into the formation of this swelling, were removed. Healing took place by first intention. The right adnexa must be excluded as the seat of the supposed extra-uterine gestation; the abdominal end of the tube was completely closed, the lumen filled with thick, yellowish, odourless pus. The conclusion at first arrived at was that the left tube, whose abdominal end ran immediately over the hæmatocele, was the site of an ectopic fœtation. Krömer examined the specimen, however, and affirmed that it was not a case of tubal gestation, as the tube was normal; its epithelium was intact, the deeper layers of the mucous membrane presented slight inflammatory changes, but no villi could be found anywhere.

Conclusions based upon such evidence as the above-cited cases afford are always open to the criticism (1) that it is very easy to overlook villi and other gestation products in large hæmatoceles; (2) that a gravid tube may very rapidly contract down to its normal size after rupture or the expulsion of its contents. In the

Obstetrical Transactions, London, 1898, vol. xl., p. 185, Cullingworth records a case of tubal rupture at the seventh week, in which he operated nine hours after signs of rupture made themselves evident. He found a small tear at the uterine end of the right Fallopian tube, with blood-clot adherent to it, in which villi were found upon microscopic examination, but in the part of the tube removed no sign of previous dilatation was apparent. C. L.

Retro-uterine Hæmatocele caused by Bleeding from the Ovary (A. GABRIEL: *Archiv für Gynäk.*, vol. lxiv., No. 2, 1901).—The causation of retro-uterine hæmatocele is not as yet completely understood, though extra-uterine pregnancy is recognised as its commonest origin. Clinical observation can never settle the point, which can only be determined by post-operative and post-mortem investigation. Of six cases which the writer has observed, he describes one which presented the clinical picture of ectopic pregnancy, but which was proved by examination of the operation specimen to have been due to bleeding from a ruptured Graafian follicle. The patient was twenty-four years of age, very anæmic, and bent double when walking. She complained of pain in the lower part of the body, weakness, fainting, and bleeding from the vagina. As to history, menstruation had earlier been normal; she had never been pregnant. During the previous year she had been three months in a hospital, suffering from pain and purulent discharge of gonorrhœal origin. This condition had continued to trouble her. When her menstrual period (previously regular) was by six days overdue, pain and profuse bleeding began. There was no history of the passage of a decidual membrane. The bleeding continued, with frequent fainting; the pain increased, and the patient was brought into hospital, where retro-uterine hæmatocele, due to ectopic pregnancy, was diagnosed. She was treated by opium, ice-bags, and rest in bed for sixteen days. Gonococci were found in the vaginal discharge. The pouch of Douglas was then opened, and a quantity of blood was removed; no fœtal structures were found. The adnexa were not within reach, so anterior colpotomy was done, and the uterus was easily brought into the vagina with the left ovary. This was enlarged, and contained a cavity the size of a cherry, from which fresh blood was running. Ovary and tube were removed. The right adnexa were fixed by adhesions, and the tube burst while efforts to free it were being made, pus escaping freely. The uterus, with the pus-tube and right ovary, were then removed. The patient slowly recovered. Professor Beneke, on examination of the specimen, failed to prove that ovarian pregnancy had occurred, the bleeding having come from a large ruptured Graafian follicle.

The proportion of cases of hæmatocele due to ectopic pregnancy is estimated by Weiss at 12 per cent.; by Oberer at 5 per cent.; by

Thorn at 28·57 per cent. (Hallenser) and 57·4 per cent. (Magdeburg); by Elschner at 56·4 per cent.; and by Thévenard at 95 per cent. Veit found forty cases of pregnancy amongst 146 of hæmatocele. Leopold has described three cases of bleeding in the ovarian stroma, and quotes one (from Scanzoni) in a girl of eighteen, and one (from Schulze) in a new-born child. Elschner records thirty-nine cases of hæmatocele, in which twenty-three were diagnosed as due to tubal gestation; in the other sixteen cases it could not be proved that the bleeding was ovarian in origin. Cullingworth is said to consider the cause of hæmatocele to be ectopic gestation in most cases, nineteen out of twenty mentioned by him being of this nature. W. E. F.

Vaginal Cancer.—Roger Williams (*New York Medical Record*, Nov. 30, 1901) has prepared some notes on this disease, useful as a pure summary. His bibliography includes Bernard's thesis, published in 1895, but omits Hubert Roberts' case published in the *Transactions* of the Obstetrical Society, vol. xxxviii., p. 381. In the discussion on the reading of this case, Dr. Lewers stated that he had seen a good many examples of primary cancer of the vagina (*loc. cit.*, p. 384). Williams notes that, notwithstanding its rarity, cancer of the vagina is by far the least rare form of primary vaginal neoplasm, although less than 1 per cent. of all cancers in women are of vaginal origin. Cancers of the lower part of the vagina nearly always invade the vulva, so that when seen at a late stage it may be difficult to determine their precise origin. Sarcoma has probably been classified as cancer in Johannovsky's case, where the patient was a child aged nine, and Williams is suspicious of Guersant's often-quoted case, where the patient was only three and a half years old (D'Arcy Power and others have recently written on sarcoma of the vagina in young children). In seventeen cases in Williams' list the average age at onset was as young as 40, whilst that writer's average for uterine cancer is 44, and for cancer of the breast 48. He admits one authentic case beginning at 17. Still, the decade 50 to 60 is the period of maximum frequency of onset. It is generally believed that in nearly every case the patient has borne children, but Bernard has shown that about one-fourth of all cases accurately recorded have never been pregnant. Many considerations open to reasoning in the study of a disease so common as cancer of the uterus are impossible to treat satisfactorily in respect to a malady of which only 130 cases have been recorded, doubtful examples included. Williams insists on the very comprehensible fact that the disease is often advanced before detection, as there is little pain, and discharge is easily misinterpreted. He admits, but does not lay stress on, pain during connection, and summarizes the distribution of the primary symptom in 16 cases in his list as discharge in 9, pain in 3, a swelling near the vaginal orifice in 2, retention of urine in 1, and

enlarged inguinal glands in 1. The unsatisfactory results of even the sacral operation as treatment are well known. In Bernard's list of sixteen women subject to primary cancer of the vagina during the child-bearing age, no less than five were pregnant. Most cases go to full term, when delivery is spontaneous as a rule; but abortions are not rare; it is dangerous to induce them. A. D.

Primary Sarcoma of the Vagina in an Infant. — GUYOT (*Revue de Gynéc. et de Chir. Abdom.*, Sep.-Oct., 1901) read a case of this disease at the recent meeting, at Nantes, of the Congrès d'Obstétrique, de Gynécologie et de Pédiatrie. The child was twenty-five months old when observed. She had suffered from purulent and bloody discharge followed by attacks of retention of urine associated with, or rather caused by, protrusion of the tumour, bit by bit, at the vulva. Sloughing of the protruding portion followed each attack, when catheterism was always needed. The child died of sepsis from peritoneal as well as vaginal suppuration caused by the usual retrograde changes in the tumour. The seat of the new growth was the posterior wall of the vagina, and it was made up of embryonic cells without any traces of teratoma. Thus, this tumour was a sarcoma of the type very widely distributed in its primary form. It was not an example of the racemose sarcoma of the vagina, which seems confined to infants, and selects, as a rule, the anterior vaginal wall. This remarkable type of tumour appears to be the same as the racemose sarcoma of the cervix in the adult, being made up of embryonic striped muscle cells. A. D.

Retention of the Menses and Doubling of the Genital Canal.—GROSS (*Annales de Gynéc. et d'Obstét.*, vol. lvi., Dec., 1901), publishes a long paper on this subject, which contains a synopsis of the views of the leading Continental authorities, with full references to this rare condition. The chief interest of the article is centred upon the subject of treatment, some of the operative measures advised being a distinct advance upon those generally adopted.

With regard to vaginal puncture and incision in hæmatocolpos and hæmatometra, the author maintains that it is not a curative method, and, further, that it is insufficient and a mere means of exploration. It may be used, of course, as a palliative treatment, where the general condition of the woman does not admit of any prolonged operation. In *lateral hæmatocolpos* vaginal incision, and excision of the intervaginal septum with suture ('bi-muqueuse') of the cut mucous surfaces, is the operation of choice.

In *lateral hæmatometra* and *hæmatocolpometra superior*, when easily reached from the vagina, incision with suture of the cut mucous surfaces, if possible, is indicated; and if no complication exist this should be curative. Should there be concomitant hæmato-

salpinx, a complementary laparotomy may be necessary. In some cases it may be impossible to make a precise diagnosis except by abdominal section, so that this method is often indicated.

With *hæmatometra* in a *double uterus* ablation by laparotomy of the distended half, together with the appendages of that side, is necessary, the half uterus and corresponding ovary being preserved. If this be impossible on account of the intimate connection of the two halves, supravaginal or total abdominal hysterectomy may be necessary. If the tumour is not of great size removal of the ovaries may suffice, especially if the patient is in a grave condition. This is an easy and rapid operation, and at the same time arrests the further growth of the tumour.

In the case of *uterus bicornis* ablation of the distended horn may be impossible, the uniting septum in some cases being very distinct and vascular, rendering its division a dangerous proceeding; it also weakens the remaining wall, and may lead to the risk of ultimate rupture. Here complete abdominal hysterectomy is a better proceeding than removal of the distended cornu, unless this be a strictly limited or pedunculated mass. Short of this, if the patient is seriously ill and the tumour not very large, removal of the ovaries may be practised. In *uterus unicornis* without a rudimentary horn indications for operation are the same as with hæmatometra. If the tumour be a large one, and fails to collapse after vaginal incision, hysterectomy is the last resource. In *uterus bilocularis* there is no question of removal of the distended portion, and the choice lies between removal of the ovaries and hysterectomy.

Summing up the matter, the author concludes that vaginal puncture is a palliative operation. With lateral hæmatocolpos the operation of choice is incision and section of the intervaginal septum, the cut mucous surfaces then being united. In the case of concomitant hæmatosalpinx preliminary or complementary salpingectomy is necessary. In lateral hæmatometra vaginal incision may be attempted, but the best operation is enucleation and excision by the abdominal route. Bilateral removal of the ovaries (with or without vaginal incision) and abdominal hysterectomy constitute operations of necessity. C. H. R.

The Bacteriology of Cystitis, Pyelitis, and Pyelonephritis in Women.—In the *Johns Hopkins Hospital Reports*, vol. x., 1901, THOMAS R. BROWN, M.D., has an exhaustive paper on this subject, and gives notes of 100 cases, composed as follows:

Acute cystitis, 26.

Chronic cystitis, 31 (24 alone, 7 with pyelitis and pyelonephritis).

Tuberculous cystitis, 6 (2 alone, 4 with pyelitis and pyelonephritis).

Acute pyelitis and pyelonephritis, 2.

Chronic pyelitis and pyelonephritis, 12 (4 alone, 8 with cystitis).

Tuberculous pyelitis and pyelonephritis, 6 (2 alone, 4 with cystitis).

Cases with symptoms suggestive of cystitis, but with no infection, 17 (due to ordinary hyperacidity, 9; due to other causes, 8).

Each case was most carefully examined chemically, microscopically, and bacteriologically. The method of obtaining urine aseptically was:

From the Bladder.—The vestibule was carefully cleansed with 1 in 1,000 bichloride of mercury, and then with sterilized water. A sterilized glass catheter, having on its distal end a sterilized rubber cuff, 10 centimetres long, was then passed into the urethra. After allowing a small quantity of urine to flow, in order to wash out any micro-organisms which may have been introduced, the rubber cuff was pulled off, and 20 centimetres of urine collected in a sterile tube, the wool plug only being removed during the collection of urine.

From the Kidney.—The bladder having been thoroughly irrigated (and if there is infection of the bladder the ureteral orifices having been carefully swabbed with a nitrate of silver solution), a sterilized tube with a cuff on is introduced into the ureter, and urine drawn off as before.

As a result of his investigation, Brown comes to the following conclusions:

1. The direct cause of infection of the urinary tract in women is the invasion of some form of micro-organism.

2. The commonest micro-organism found is the *B. coli communis*, and its virulence and pyogenic properties vary greatly.

3. Tubercle bacillus, *B. proteus vulgaris*, and staphylococci are frequently found; typhoid bacillus and *B. pyocyaneus* rarely.

4. More women are proportionately infected by *B. coli communis* than men, from the close proximity of the anus to the urethra.

5. Besides the micro-organisms, the chief factors essential for the development of cystitis are anæmia, malnutrition, trauma of, and pressure upon, the bladder, congestion of the bladder, and retention of urine.

6. In cystitis the chief mode of infection is by the urethra; in pyelitis and pyelonephritis from an infected bladder, or the blood and lymph currents.

7. In most of the cases of acute and chronic cystitis, pyelitis, and pyelonephritis, the urine was acid.

8. Where the urine is alkaline, it can, by rendering the bladder

wall susceptible, produce infection without any accessory etiological factor.

9. In a chronic case, where infection of the kidney has been due to a urea-decomposing micro-organism, a calculus will very likely be present.

10. Urinary hyperacidity of neuropathic origin presents most of the symptoms of cystitis, although there is no infection, and so is apt to cause difficulty in diagnosis.

11. Tubercular infection of the urinary tract frequently occurs, with no other demonstrable tuberculous lesion elsewhere in the body.

12. Renal infection can only be absolutely diagnosed by catheterization.

13. The colon bacillus is the common cause of pyelitis; *B. proteus vulgaris* and staphylococci less frequently.

THERAPEUTICAL SUGGESTIONS.—1. Give water in large amounts by the mouth, rectum, or subcutaneously, especially in acute infections and in all forms of pyelitis, since the lower the specific gravity, and consequently the less albumin and urea present, the poorer will be the medium for the micro-organisms to grow in.

2. Urotropin, cystogen, salol, by rendering the urine aseptic, are of great value in acute, but unsatisfactory in chronic, infections.

3. Boric, benzoic, camphoric acids should be given where the urine is alkaline; bicarbonate of soda, citrate of potash where the urine is acid, because the urea-decomposing micro-organisms have their growth hindered by hyperacidity of the urine, and the micro-organisms rendering the urine acid are affected in a similar way with hyperalkalinity.

4. In urinary hyperacidity without infection administer an alkaline treatment, and treat the neuropathic manifestations.

5. Increase the resisting powers of the patient by attention to the general health. C. B.

Ovarian Organo-therapy (WILLIAM KRUSER, M.D.: *Johns Hopkins Hospital Bulletin*, vol. xii., No. 124, 1901).—The author draws attention to the conclusions of Curatulo in regard to the internal secretion of the ovary:

1. The ablation of the ovaries exercises a considerable influence on metabolism.

2. The quantity of phosphates eliminated by the urine is notably diminished after the removal of the ovaries.

3. The curve of nitrogen-elimination after ovariotomy, ascertained either by Kjeldahl's method or by Yvon's, presents a slight oscillation, without a very distinct tendency to elevation or lowering.

4. After oöphorectomy, the quantity of carbonic acid eliminated by the respiration, and that of the oxygen absorbed, diminish considerably up to a certain limit, after which it remains stationary.

5. In animals from which the ovaries have been removed, the curve of the weight rises until it attains considerable proportions from five to six months after operation.

6. When a certain amount of ovarian juice is injected subcutaneously into cats deprived of the ovaries, the quantity of phosphates eliminated by the urine, which diminished considerably soon after the operation, tends to increase, and even become superior to that which was ascertained before the operation; when still larger amounts are injected, the quantity of phosphates increases in a very marked degree.

Curatulo, as a result of his experiments, formulates the following theory: 'The ovaries, like other glands of the animal economy, have a special internal secretion. These glands eventually throw into the blood a peculiar product, the chemical composition of which is completely unknown, and the essential properties of which tend to favour the oxidation of phosphorized organic substances, of carbohydrates, and of fatty substances.' From this it would appear that if the function of the ovaries is suppressed, as before puberty, after the menopause, or after oöphorectomy, there should be a more considerable retention of organic phosphorus, and a greater tendency to corpulency, and this, as a rule, is seen to be the case.

The author, encouraged by the good reports of several investigators who had used ovarian extract, has carefully tried the remedy in selected cases for the past three years, (1) in those suffering from amenorrhœa, dysmenorrhœa, and other forms of pelvic disease; (2) in those suffering from symptoms of premature menopause following removal of uterine appendages; (3) for the disturbances associated with the natural menopause. He comes to the following conclusions:

1. No good was done to the cases of amenorrhœa and dysmenorrhœa.

2. The best results were seen in the second class of case for the relief of symptoms of the artificial menopause.

3. No apparent result was noticed in the natural menopause.

The author states that ovarian extract is practically harmless; that no reliance can be placed on the drug, as it often proves valueless when most indicated; and that where any effects have been noted, increase in the dosage made no difference. C. B.

REPORTS OF SOCIETIES.

OBSTETRICAL SOCIETY OF LONDON.

Wednesday, January 1, 1902, PETER HORROCKS, ESQ., M.D., *President, in the Chair.*

A Case of Chorio-Epithelioma with Pulmonary Metastases.—Dr. CUTHBERT LOCKYER read a paper on this subject. The evidence of an abortion lay in the fact that the patient lost blood freely for four months before admission, the loss continuing until the case was sent to hospital. The patient was forty-two years of age. She had given birth to seven children. The last confinement took place three and a half years before admission into the Samaritan Hospital. Three abortions are recorded, the last being thirteen years previously. The patient was admitted with evident uterine enlargement, and in a condition which prohibited operative interference. The uterus was perforated by a new growth in its walls, and secondary deposits were found in the lungs. Pathological proof of the occurrence of chorio epithelioma following immediately on the removal of hydatidiform mole was given by the author, who concluded the paper by giving a lantern demonstration illustrating (*a*) the close association between vesicular mole and chorio-epithelioma; (*b*) the structural differences between chorio-epithelioma and sarcoma deciduo-cellulare.

The PRESIDENT remarked that it was quite impossible to prove definitely whether these malignant growths were of maternal or of fœtal origin. It was for this reason that he had named his own specimen — shown at this Society some months ago — 'deciduoma malignum,' the name given by Sänger, who first described it. He could not help leaning to the view that it was fœtal in origin, and he did not see how those who believed in its maternal origin could get over the fact that it so often followed upon hydatidiform mole. The point raised by Dr. Lockyer that there were two sorts, one without syncytial elements, probably maternal in origin, to which the term 'deciduoma malignum' would be appropriate, and one with syncytial elements of fœtal origin, for which the term 'chorio-epithelioma' would be better applied, was no doubt very important.

Mr. ALBAN DORAN stated that when the patient was admitted into his wards she was too ill for any operation. At first sight sloughing fibroid seemed probable, but on further examination extensive malignant disease was evident. It was remarkable that she lived so long. Dr. Lockyer was to be congratulated for his excellent report of the pathology of this case.

Dr. HERBERT SPENCER said that, while he agreed with the main views of the author, he thought it would for the present be better to use the term 'deciduoma malignum' until we knew a little more about the pathogenesis of the disease. There was no doubt that two distinct classes of

growth had been described under this name. But Klebs—who was, he thought, the first pathologist to investigate the disease—had hesitated whether to describe it as a cancer or a sarcoma, and the late Dr. Kanthack had stated his decided opinion that his (Dr. Spencer's) case, which showed large masses of typical syncytium, was a sarcoma. He thought, therefore, it was a little premature to style it a chorio-epithelioma, though personally he was inclined to regard the syncytial growth as of that nature.

In reply, Dr. LOCKYER stated that the patient's history afforded no proof of a period of amenorrhœa prior to the onset of hæmorrhage, which began suddenly in June and continued until November, 1900. He thought that the syncytial masses were of chorionic origin, and if a chorionic villus is entirely fœtal, it follows that any neoplasm arising therefrom must likewise be of fœtal origin. He adopted this nomenclature of chorio-epithelioma for his specimen, believing that the syncytial envelope of a chorionic villus is an epiblastic fœtal structure. The term 'syncytial carcinoma' would be equally applicable in the case of these new growths.

A Case of Primary Pneumococcus Meningitis.—Dr. THOMAS WILSON read a short communication on a fatal case of primary pneumococcus meningitis simulating puerperal eclampsia, in which there was 1·5 per cent. of sugar in the urine, but only a cloud of albumin.

EDINBURGH OBSTETRICAL SOCIETY.

Wednesday, January 8, 1902, DR. JAMES RITCHIE, *President, in the Chair.*

Symphysiotomy.—Dr. ALFRED SANDSTEIN contributed a paper on 'The Movements of the Pelvic Bones during the Operation of Symphysiotomy, and the True Function of the Section of the Pubic Symphysis.'*

Expulsion of a Dermoid Ovarian Cyst per Vaginam during Labour.—Dr. F. W. N. HAULTAIN described this case. He noted the extreme rarity of such an occurrence. The patient was a 3-para who had been in labour for twenty-four hours, and the membranes had ruptured twelve hours previously. As a soft mass had been felt bulging through the posterior vaginal wall, an attempt at delivery by means of forceps had been made, with the result that the mass had protruded through the vulva. On examination by Dr. Haultain, the mass was found in the vagina, but became detached on attempting to draw it down, and so it was removed. Forceps were at once applied and the woman delivered. The tumour was found to be an ovarian dermoid cyst, which had been driven through the posterior vaginal wall. The rent in the vagina was packed with a strip of iodoform gauze about 2 inches wide and 4 feet in length, and an antiseptic douche was given. The patient made an uninterrupted recovery.

Referring to the literature of the subject, he found that labour obstructed by pelvic tumours was rare, and might be said to occur only once in 4,000 cases, but if labour were left to the spontaneous efforts of Nature a

* This paper will be published in an early number of this Journal.

mortality of 50 per cent. occurred. The recognised modes of management might be summarized as follows:

1. Postural reposition of tumour into abdomen.
2. Artificial delivery *per vias naturales.*
   (*a*) without diminishing size of tumour.
   (*b*) after diminishing size of tumour.
3. Cæsarean section and ovariotomy.
4. Vaginal ovariotomy.

One fact was clear, that the mortality due to forcible dragging of the child past the obstruction should abolish this operation. The results obtained by reposition and simple disintegration offered almost equal success, *i.e.*, a death-rate of 12 per cent., surely far beyond what might be reasonably expected from the operative methods now at our disposal. The cause of death in both of these methods was generally peritonitis set up by the injury to the tumour. It would thus seem that the early removal of the tumour should be the treatment aimed at. This result might best be attained by (1) vaginal ovariotomy before delivery; (2) ovariotomy as soon as possible after delivery, either after reposition or disintegration of the growth before expulsion of the child. The former procedure might be readily carried out by the practitioner. Abdominal ovariotomy within twenty-four hours of delivery did not seem to be more dangerous than at any other time, and would furnish a mode of treatment with a mortality of less than 5 per cent.

ROYAL ACADEMY OF MEDICINE IN IRELAND.

Section of Obstetrics.

December 20, 1901, *the President*, Dr. W. J. Smyly, *in the Chair.*

A patient was exhibited and paper read by Dr. A. Horne, entitled **Notes on a Case of Cæsarean Section**. Mrs. T., aged twenty-three; second pregnancy, was admitted into the National Maternity Hospital at 11.30 a.m. on Sunday, July 21, 1901. She was born in the North, and was considered a weakly child in her first years. She was reared in a chair, as she had not the use of her legs until she was five years old. First labour, October, 1898, took place in the Rotunda Hospital. Patient was in labour some ten hours, when, after a prolonged instrumental delivery, a dead fœtus was extracted. Her last menstruation was on October 22, 1900. At 6 a.m. on Sunday, July 21, 1901, the membranes ruptured. At 10 a.m. she was visited by Dr. Elizabeth Massey, who diagnosed a highly contracted pelvis, and had the patient at once removed to hospital.

Examination.—The patient was small, delicately built; height 4 feet 4 inches. The diagonal conjugate measured $2\frac{3}{4}$ inches.

Operation. — At 3.30 p.m. patient was placed under chloroform and an abdominal incision was made, extending from 3 inches above the umbilicus to 2 inches of the symphysis pubis. The uterus was delivered through the abdominal wound, which was temporarily united behind it. An incision was made through the uterine wall, commencing high up at the fundus, but avoiding the lower uterine segment. The placenta

was in front, and was rapidly cut through ; bleeding was at once profuse. The child was seized by the buttocks and extracted; the head followed without any difficulty. The infant, a female, at once cried out. The assistant's hand grasped the uterine edges until an elastic ligature was applied. The placenta was detached without difficulty. The uterus contracted well, the wounded surfaces were brought together by means of six deep and four superficial silk sutures. The abdomen was closed likewise, using silk for the deep sutures and silkworm gut for the superficial. The operation lasted forty minutes, the patient leaving the table in good condition.

He would not discuss the Cæsarean operation in its relations to other operations, such as symphysiotomy, craniotomy, and Porro's operation, as the time at his disposal was too limited. We could not, however, shut our eyes to the fact that the Cæsarean operation was gradually being restored to a position not unlike that of ovariotomy, so that we could speak with confidence, as a rule, to a favourable result. The dangers attending the Cæsarean operation ought not to be as great—certainly not greater—than an ovariotomy; but students must be more fully instructed in the recognition of degrees of pelvic obstruction, so that it would not be necessary for the obstetrician to learn through delay, or through failure with forceps, version, or craniotomy, that a Cæsarean section was demanded.

Dr. GLEN thought the bold, good cut going right through the placenta, if it lay in the line of incision, was good surgery. The risk of soiling the peritoneum by the liquor amnii might be avoided by binding round the uterus ; bringing the womb out through the abdominal incision added to the shock. For a living child he recommended the Cæsarean section, but if the child was dead he preferred Porro's operation.

Dr. W. J. SMYLY said pelvic deformities were not often met with in Ireland compared with other countries. During his seven years' term as Master of the Rotunda he had only four Cæsarean sections and four symphysiotomies, yet from a letter he received from Glasgow he learnt that one of the surgeons of the maternity had nine Cæsarean sections in nine months. In all these cases the question arose, should the woman be made sterile at the time of the operation ? He thought not. Could you choose your time for operation ? If so, by all means select daylight.

GLASGOW OBSTETRICAL AND GYNÆCOLOGICAL SOCIETY.

Wednesday, December 18, 1901, ROBERT JARDINE, M.D., *President, in the Chair.*

Discussion on the Treatment of Uterine Fibromyoma. — Dr. JOHN EDGAR classified treatment into (1) *Expectant*, (2) *Medical*, (3) *Electrical*, and (4) *Surgical*. (1) *Expectant Treatment* was indicated when the tumour caused only trifling symptoms. The only exceptions he would make were those complicated by pregnancy, with consequent probability of danger arising. Myomectomy or hysterectomy was then indicated. (2) *Medical Treatment* by ergot, hydrastis, bromides, calcium

chloride, etc. The most that could be expected from the use of these drugs was a diminution of hæmorrhage or pain, and possibly a slight decrease in the size of the tumour. The only cases suitable for medical treatment were those in which the symptoms could be controlled, and in which the tumour remained stationary or was getting smaller. (3) *Electrical Treatment.*—His experience of Apostoli's method had led him to the conclusion that, if used at all, it should be reserved for cases where hæmorrhage was the chief symptom. (4) *Surgical Treatment*—(*a*) *Curettage.*—This was only a palliative for hæmorrhage and leucorrhœa. He had found it of marked benefit in several instances. (*b*) *Operations intended to lessen the nutrition* of the tumour, either by removal of the uterine adnexa or by various methods of ligating the uterine arteries. These were now rarely performed, and he had never had recourse to them. (*c*) *Myomectomy.*—The cases suitable for this were polypi, sessile submucous, and pedunculated subserous fibroids. Some surgeons also included certain forms of intramural and sessile subserous fibroids, but he considered these unsuitable for enucleation unless one or two only were present. (*d*) *Removal of the uterus* in whole or in part along with the tumour. He had tried all methods, but preferred supravaginal amputation in most cases. Panhysterectomy was indicated especially for cervical fibroids which could not be enucleated, or were associated with tumours of the corpus uteri or with malignant disease.

Mr. R. H. Parry confined his remarks to the surgical methods he followed, and to the measures he adopted to prevent shock. An enema containing 4 ounces peptonized milk, 20 minims tinct. opii, and 2 to 4 drachms of brandy, was given the previous evening. Just before operation 2 to 3 pints saline solution were passed into the median basilic vein. A pint of saline was also poured into the abdomen after opening. Whether owing to careful preparation or the free use of saline solution, he had been particularly struck by the slight disturbance after operation, vomiting being usually slight or absent.

Dr. Samuel Sloan gave the following indications for electrical treatment: (1) For painful inflammatory products or pain from extra-uterine causes, the secondary faradic current; (2) for inflammatory products, with little or no pain and no bleeding, the negative pole of the galvanic current; (3) for bleeding and no inflammatory products, the primary faradic current; (4) if bleeding does not yield to moderate currents, dilate and curette, and again use the current as above.

NORTH OF ENGLAND OBSTETRICAL AND GYNÆCOLOGICAL SOCIETY.

Friday, December 20, 1901, T. B. Grimsdale, M.B., *President, in the Chair.*

Subperitoneal Multilocular Cyst. — Mr. E. Stanmore Bishop related the case of a married woman, aged fifty-four, in whom an abdominal enlargement had been observed for about two years. The

rate of growth had increased recently. Multilocular ovarian cyst was diagnosed. On November 20, 1901, abdominal section was performed. A large cyst was found beneath the layers of the broad ligament of the right side which contained 27 quarts of brownish fluid. Below were numerous smaller, but still fairly large, cysts containing whitish colloid material. Over the peritoneal covering was stretched an enlarged, firmly adherent and thickened appendix, the thickness of the little finger, and about 6 inches long. This was removed in the usual way. The cavity was drained with a gauze packing, which was removed during the next six days. Progress was normal until December 15, when a sudden attack of fatal paralysis took place, probably from embolism. The case was unusual, both from the great size of the tumour—it contained 864 ounces of fluid in its largest cyst, against 700 which Bland Sutton mentions as the greatest amount he has found in a parovarian cyst—and still more because it was not monocystic, as most parovarian cysts are, but multicystic. The fluid was not limpid, as in most parovarian cysts, but in the smaller cysts was distinctly colloid, and in the larger turbid and dark, probably from blood extravasation.

Uterine Fibromyoma removed by Abdominal Section, by Dr. Lloyd Roberts, M.D., Manchester.—The specimen which was exhibited was removed by abdominal section from a multipara, aged forty-three. The tumour proved to be a soft myoma growing out into the right broad ligament. The broad ligaments were ligatured, and the uterus amputated across the supravaginal cervix. About the fourteenth day there were some symptoms of slight sepsis or sapræmia, probably arising from some condition of sloughing or necrosis in the sutured stump. This cleared up, and the patient rapidly recovered. Dr. Lloyd Roberts wished to ask the experience of members of the Society in these operations as to the risk and frequency of septic symptoms arising from infection of the stump. He had heard it stated that such signs had been present in 30 per cent. of cases.

Dr. Donald remarked that septic infection of the stump was preventable by scrupulous care in avoiding infection. If bleeding was not accurately stopped, blood-clot would form and collect, and might become septic. On the other hand, if the control of the vessels was too great, there was a possibility of some necrosis taking place in the tissues of the stump.

Dr. Walter, referring to the question of stump infection, stated that until recently he preferred to perform panhysterectomy, and was inclined to think at present that recovery was more rapid and thorough than in operations in which the stump was left behind. Lately he had noticed that in two out of five cases of supravaginal amputation there had been evidence of some localized cellulitis about the neighbourhood of the stump.

The President (Dr. Grimsdale) had not experienced any trouble from the stump, and his experience had led him to prefer the newer operation.

Mr. Stanmore Bishop questioned the advantage of leaving the stump behind. Apart from the question of septic infection, there was the

possibility of some fibromyomatous foci being present, which might develop subsequently into larger tumours.

Dr. LLOYD ROBERTS, in reply, thought that the operation he selected was more quickly performed, and that there was less risk of injury to the ureters than in panhysterectomy. He suggested also that the presence of the stump might form a better protection and support for the abdominal viscera, and that there was less danger of peritonitis.

Case of Double Papillomatous Ovarian Cyst, with Recurrence Five Years after the Primary Operation, by ARCHIBALD DONALD, M.D., Manchester.—In July, 1896, Dr. Donald removed a papillomatous cyst of each ovary. There was no evidence of rupture, but a few warts were found on the peritoneum of Douglas's pouch. The abdomen enlarged again in 1901, and rapidly increased a month before operation. On opening the abdomen a large quantity of brownish fluid escaped, and a large, hard papillomatous mass then came into view. This seemed to becomposed of an aggregation of small warty growths, which grew chiefly in the omentum, but also invaded the hilum of the liver. There were several small growths of a warty character scattered about in the peritoneum. As it was hopeless to attempt the removal of the tumour, the incision was closed, without drainage, after all the fluid had been allowed to escape. Histological examination of a small piece of the tumour, which was removed, showed numerous papillæ covered with cubical epithelium, and lined with a core of loose cellular tissue. The epithelium was arranged sometimes in one, but mostly in two or three layers, but did not invade the deeper tissues. Dr. Donald referred to the uncertainty of cure after removal of ovarian papillomata. When large growths were found generally diffused on the peritoneum, the prognosis was bad. When the secondary growths were small and limited, their disappearance generally followed removal of the primary growth.

REVIEWS OF RECENT BOOKS.

HUMAN PLACENTATION: AN ACCOUNT OF THE CHANGES IN THE UTERINE MUCOSA AND IN THE ATTACHED FŒTAL STRUCTURES DURING PREGNANCY. By J. Clarence Webster, B.A., M.D., F.R.C.P.E., F.R.S.E. With 233 illustrations. Chicago: W. T. Keener and Co.

In the subject of human placentation 'recent investigations, instead of harmonizing divergent views, have only tended to aggravate dissension.' This is explained by Dr. Webster as due to several causes, prominent amongst which is the tendency to accept as beyond challenge statements made by old and renowned investigators. He also blames the habit of generalizing from facts obtained from the study of single specimens, and mentions the hurtful influence of party or national bias in the discussion of scientific problems.

The volume under consideration is perhaps the most serious attempt which has as yet been made to disentangle the thread which runs through the ravelled skein of placental literature. The author's previous works, notably his monograph on Ectopic Gestation, prove that he is no slave to scientific 'authority.' A Canadian long resident in Edinburgh, devoted to foreign study, and an enthusiastic reader of Continental literature, he has returned to Chicago free from leanings toward the Teutonic host, or toward the triple alliance of French, Belgians and Dutch who struggle on the broad field of the human placenta. During the past eleven years Dr. Webster has examined the pregnant uterus during every month of pregnancy, during each of the stages of labour, and during various stages of the puerperium. He has also investigated the pregnant uterus in various stages in the mouse, rat, rabbit, guinea-pig, pig, sheep and cow. His conclusions, therefore, cannot be said to rest upon any narrow basis. The actual results of this work are given to us in the present volume in the form of 216 reproductions of the author's micro-photographs. These occupy twenty-nine plates, and form a most valuable record of the changes in the decidua and the attached fœtal structures during pregnancy. The other illustrations are a coloured plate giving three diagrammatic representations by the author of the relationship of the ovum to the decidua serotina, and twelve figures in the text, which are borrowed from Peters, Leopold, Merttens and Hubrecht, and are all of great interest. The author's conclusions on certain debated points may be briefly indicated. He considers that the old and long-taught view that the chief degeneration of the decidua is of a fatty nature can no longer be held. The trophoblastic nature of the outer epiblastic layers of the ovum must be considered well established. The chorionic vesicle eats its way into the compact layer of the uterine mucosa, probably by the activity of its epiblastic covering. During the second week the fœtal mesoblast, in which capillaries develop, penetrates the trophoblastic strands, which may be regarded as primary villi. The earliest condition of the chorionic epiblast is not a syncytium,

but is one in which the cells are distinct from one another. The plasmodial development is due to a transformation of the former toward the end of the first week of pregnancy. The chorionic epithelium is double, and both its strata, the layer of Langhans and the syncytium, are of fœtal epiblastic origin. The view that the placenta separates through the spongy layer is incorrect, separation occurring mainly through the compact layer. Dr. Webster's present contribution to science cannot fail to add to his high reputation as an investigator and a recorder. It will be welcomed by all serious students of human and comparative embryology. The author must be warmly congratulated upon the publication, in so valuable a form, of the results of the careful work of several years.

A Manual of Obstetrics. By A. F. A. King, A.M., M.D., Professor of Obstetrics in the Columbian University, Washington, and in the University of Vermont. 8th edition. London: Henry Kimpton, 1901.

The author disclaims for his work any attempt at competition with the larger text-books on obstetrics. He states that his book is elementary in character, and that no attempt has been made to develop it into a systematic treatise. It has been written with two chief objects in view: first, to 'form such an outline of the rudiments and essentials of obstetric science as may constitute a good groundwork for the student at the beginning of his obstetric studies'; and, secondly, to be of 'service to those whose onerous duties allow but little leisure for consulting larger works, and who simply desire to refresh their minds upon the more essential points of obstetric practice.'

In view of the chief purposes for which the book was written, much of purely scientific interest has been omitted. Thus, to quote but a single example, the anatomy and histology of the unimpregnated uterus are described, and the relationships of the various 'deciduæ' of pregnancy are mentioned; but no hint is given that any changes in the structure of the uterine mucosa result from the impregnation of the ovum. On the other hand, the clinical aspect of obstetrics is dwelt upon at greater length than is usual in works of its size. An excellent feature is the detailed description of how an abdominal examination ought to be conducted on a pregnant woman, and the various points to be noted in making a diagnosis of the presentation and position of the fœtus from such an examination. In order to enable the reader the more readily to follow the description of the various manipulations necessary, numerous illustrations are given This important subject is one that is too often very inadequately dealt with in text-books on obstetrics, and is unfortunately greatly neglected by the student and practitioner.

The diagnosis of pregnancy is very fully discussed, and the differential diagnosis of the gravid uterus from other abdominal enlargements is a section of the work that should prove useful to the practitioner. The medical treatment of the minor disorders of pregnancy and the puerperal period is often described at considerable length. Thus, the treatment

of vomiting occupies several pages, and even such conditions as 'toothache' and 'plethora' during pregnancy receive more than a passing notice. Many prescriptions are also given for the assistance of the practitioner.

The grave disorders and accidents of pregnancy, labour, and the lying-in state are adequately discussed from the point of view of treatment. We note, however, that no mention is made of the use of Champetier de Ribes' bag in the treatment of placenta prævia. The author has no liking for the method of vaginal plugging advocated during the last few years by the Dublin School in the treatment of accidental hæmorrhage. Asphyxia neonatorum is well dealt with, and the more unusual methods of artificial respiration are demonstrated by illustrations. At the end of the book is a chapter on the Jurisprudence of Midwifery, which deals with such matters as infanticide, rape, and impotence.

Most of the illustrations are old friends, being copies of the more important of those to be found in the larger popular text-books on midwifery.

The book is thoroughly sound; its style is lucid and its type is clear. We think that the author has successfully accomplished his purpose, and that the manual will prove helpful to the class of readers for whom it was written.

Lehrbuch der Gynäkologie. Von Max Runge, Ord. Prof. der Geburtshülfe und Gynäkologie der Universitäts Frauenklinik zu Göttingen. Berlin: Julius Springer, 1902.

A text-book by this well-known German teacher deserves the careful attention of British gynæcologists. The introduction which the author has written to his work will be read with much interest from the wide and liberal outlook with which he approaches his subject. This outlook cannot be better expressed than in his own words: 'Nicht das kranke organ soll der Frauenarzt heilen, sondern *die kranke Frau*.'

With regard to the general arrangement of the book, the only point calling for notice is the fact that no anatomical description of the female sexual organs is given. This omission, which is not referred to by the author in his introduction, enables him to limit the size of the book to the modest tale of 461 pages. A short section deals with physiology, hygiene, and general diagnosis; nine-tenths of the space at the author's disposal being devoted to a systematic consideration of the diseases of the several sexual organs.

The chapters dealing with diseases of the vagina are distinguished by a careful, though brief, discussion of the general utility of and indications for douching and tamponnade, which will be welcomed by all who are anxious to temper zeal with discretion in the employment of these measures. The chapters on 'Irritable Bladder' and 'Bladder Feebleness' are full of information upon matters for which text-books are usually ransacked in vain. Anomalies of menstruation are considered in the section on 'Diseases of the Uterus.' 'Displacements' are discussed at length, and, following the tendency of modern opinion, mechanical appliances for their relief are

awarded a comparatively unimportant place in treatment. The section dealing with 'Metro-endometritis Corporis' is almost the best account of this subject we have ever read, and is well illustrated with diagrammatic representations of the microscopic appearances. New growths of the ovary are divided into three classes: (*a*) those arising from the follicular epithelium (cysts, carcinomata); (*b*) those arising from the ovum (dermoids, teratomata); (*c*) those arising from the stroma (fibroma, sarcoma, etc.). An interesting and thoughtful article on castration, in which the remote results are allowed their proper place in forming judgment, will be welcomed by British gynæcologists.

The book is handsomely turned out by the publishers and is well illustrated.

MENSTRUATION AND ITS DISORDERS. By Arthur E. Giles, M.D. Medical Monograph Series, No. 5. London: Baillière, Tindall and Cox, 1901.

In his preface Dr. Giles states that he has endeavoured when writing this monograph to present a concise and practical exposition of normal menstruation and of the various disorders of that function, and also to make clear that these disorders are to be regarded as symptoms, the cause of which requires investigation, and not as separate diseases. After a careful perusal of his book we may congratulate him on having accomplished his object. The monograph is divided into two parts: In Part I. the Physiology of Menstruation is briefly but very clearly discussed; in Part II. the Disorders of Menstruation.

In the first chapter of the second part are some thoughtful remarks on the hygiene of menstruation, and we are sure that if governesses would only teach girls those elements of the physiology and hygiene of menstruation which may be found in Dr. Giles's book, instead of treating them on the same footing as boys, the disorders of menstruation would be much less frequent. As Dr. Giles says, the girl who is handicapped by a recurrent period of nervous irritability and physical weakness not only has to work at high pressure whilst at school, but also on her return home has in very many cases to occupy her time in sewing or attending to household duties, instead of taking healthy exercise like her more fortunate brothers.

Under the term 'Cryptomenorrhœa' and in a separate chapter, the author discusses the subject of retained menses, and both the choice of the name and the elimination of this condition from the chapter on Amenorrhœa is a very great improvement on the ordinary descriptions. In the treatment of retained menses the author does not lay sufficient stress on the frequency with which the channel made for the evacuation of the fluid may close up again, necessitating, perhaps, many operations; neither does he mention that in this class of case, or where the tubes are dilated, removal of the appendages is the only proper treatment.

This series of monographs claims to sketch in brief compass the chief features of given subjects of everyday interest to students and practitioners, and Dr. Giles in his monograph has certainly managed to compress the maximum of information into the minimum of space.